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This is the first number of a handsome quarto periodical, which it is proposed to bring out quarterly in February, May, August, and November, under the auspices of the Naval and Military Press. In an inspiring and well-phrased preface, the editor, Mr. C. Gilbert-Wood, explains the intention of the publication. It is felt, he says, that the present year will be memorable in the history of the British Army, since the changes which it has introduced mean the incorporation of the Militia into the Regular Forces, and the elevation of the Volunteers to the rank formerly held by the Militia. The effect of all this readjustment has been to give the general public a much enhanced sense of the demands made upon every citizen to join in the scheme of national defence, and to learn the elements of drill and of rifle practice. In order to give a popular impulse to the tide of military enthusiasm just now sweeping across the country, the promoters of this periodical have designed a series of illustrated biographies of the most distinguished living officers in the Army and Navy, of which this is a first instalment. Each biography consists of from eight to twelve pages of bright, informative material, preceded by an excellent portrait of the subject, taken either from a well-known picture or from some approved photograph. All the portraits are in uniform, and many of them are particularly lifelike and striking. The first number

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CONTENTS FOR SEPTEMBER, 1908.

1. VIEW OF THE BANQUETING HOUSE, WHITEHALL, IN 1713	1177
2. SECRETARY'S NOTES	1177
3. WHITEHALL PALACE AND THE EXECUTION OF KING CHARLES I. THE REV. CANON EDGAR SHEPPARD, C.V.O., D.D., SUB-DEAN OF HIS MAJESTY'S CHAPELS ROYAL (<i>Lecture</i>)	1179
4. THE DEVELOPMENT OF NAPOLEONIC STRATEGICAL AND TACTICAL METHODS, AS ILLUSTRATED BY THE BATTLE OF WATERLOO. COLONEL F. N. MAUDE, C.B., <i>p.s.c.</i> , LATE HAMPSHIRE R.E. VOLS. (<i>LATE R.E.</i>) (<i>Lecture</i>)	1194
5. SUPPLY AND TRANSPORT IN INDIA. LIEUT.-GENERAL SIR E. H. H. COLLEN, G.C.I.E., C.B.	1218
6. ON SOME FUNCTIONS OF THE PROJECTILE FROM A SURGICAL ASPECT. C. MARSH BEADNELL, FLEET SURGEON R.N.	1236
7. STUDIES IN APPLIED TACTICS. CAVALRY IN BATTLE (15TH AND 16TH AUGUST, 1870). P. LEHAUTCOURT. TRANSLATED BY PERMISSION FROM <i>Le Journal des Sciences Militaires</i> , BY MAJOR E. MAKINS, D.S.O., 1ST ROYAL DRAGOONS (<i>continued</i>)	1248
8. DEFENCE OF HARBOURS BY FORTIFICATION. BRIG.-GENERAL R. F. JOHNSON, C.M.G., R.A.	1260
9. THE IMPORTANCE OF FIGHTING DISMOUNTED FOR CAVALRY, AND THE PLACE TO BE ASSIGNED TO IT IN ACTION AND INSTRUCTION. MAJOR IMMANUEL, INFANTRY REGIMENT, NO. 158. TRANSLATED FROM THE <i>Internationale Revue nach Kavalleristische Monatshefte</i> , MAY, 1907	1273
10. THE FUTURE RÔLE OF THE FRENCH NORTHERN SQUADRON. TRANS- LATED FROM <i>La Vie Maritime</i> OF 10TH JULY, 1908. COMMUNI- CATED BY THE DIRECTOR OF NAVAL INTELLIGENCE	1281
11. NAVAL NOTES	1287
12. MILITARY NOTES	1300
13. NAVAL AND MILITARY CALENDAR FOR AUGUST, 1908	1310
14. CONTENTS OF FOREIGN PERIODICALS FOR AUGUST, 1908	1311
15. NOTICES OF BOOKS	1318

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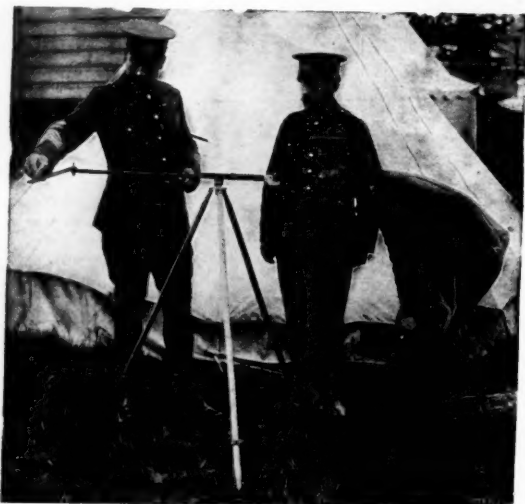
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" P. W. Game, Royal Horse Artillery.
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" R. Ommanney, Royal Engineers.
Lieut. G. P. Dawney, M.V.O., D.S.O., Coldstream Guards.
Capt. W. Drysdale, Royal Scots.
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" R. S. Allen, Lancashire Fusiliers.
" B. H. Chetwynd-Stapylton, Cheshire Regiment.
" A. Crookenden, Cheshire Regiment.
" and Brevet-Major I. Stewart, Scottish Rifles.
Lieut. H. Needham, Gloucestershire Regiment.
Capt. E. R. Clayton, Oxfordshire Light Infantry.

Capt. J. C. H. Newman, Essex Regiment.
" L. A. E. Price-Davies, V.C., D.S.O., King's Royal Rifle Corps.
" W. E. Davies, Rifle Brigade.
" L. R. Vaughan, Indian Army.
" J. Brough, Royal Marine Artillery.

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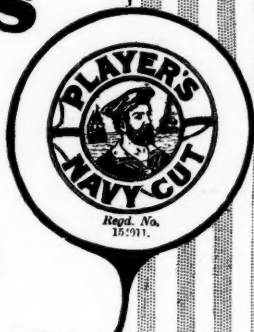
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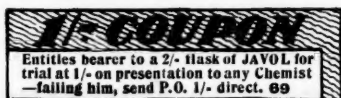
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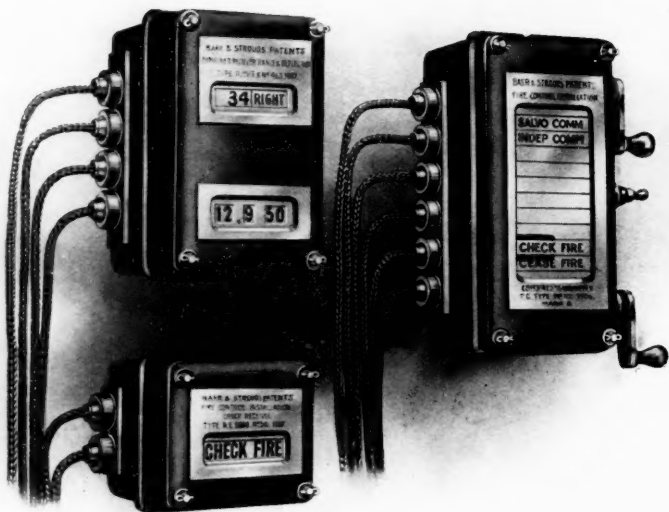
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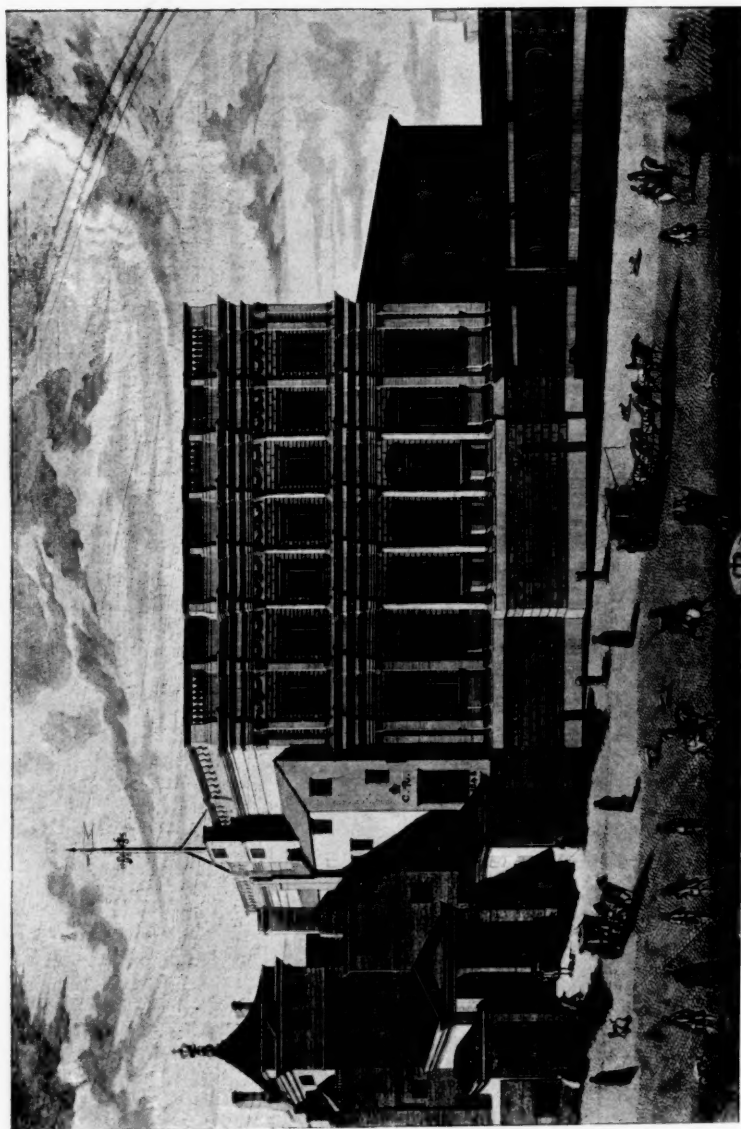


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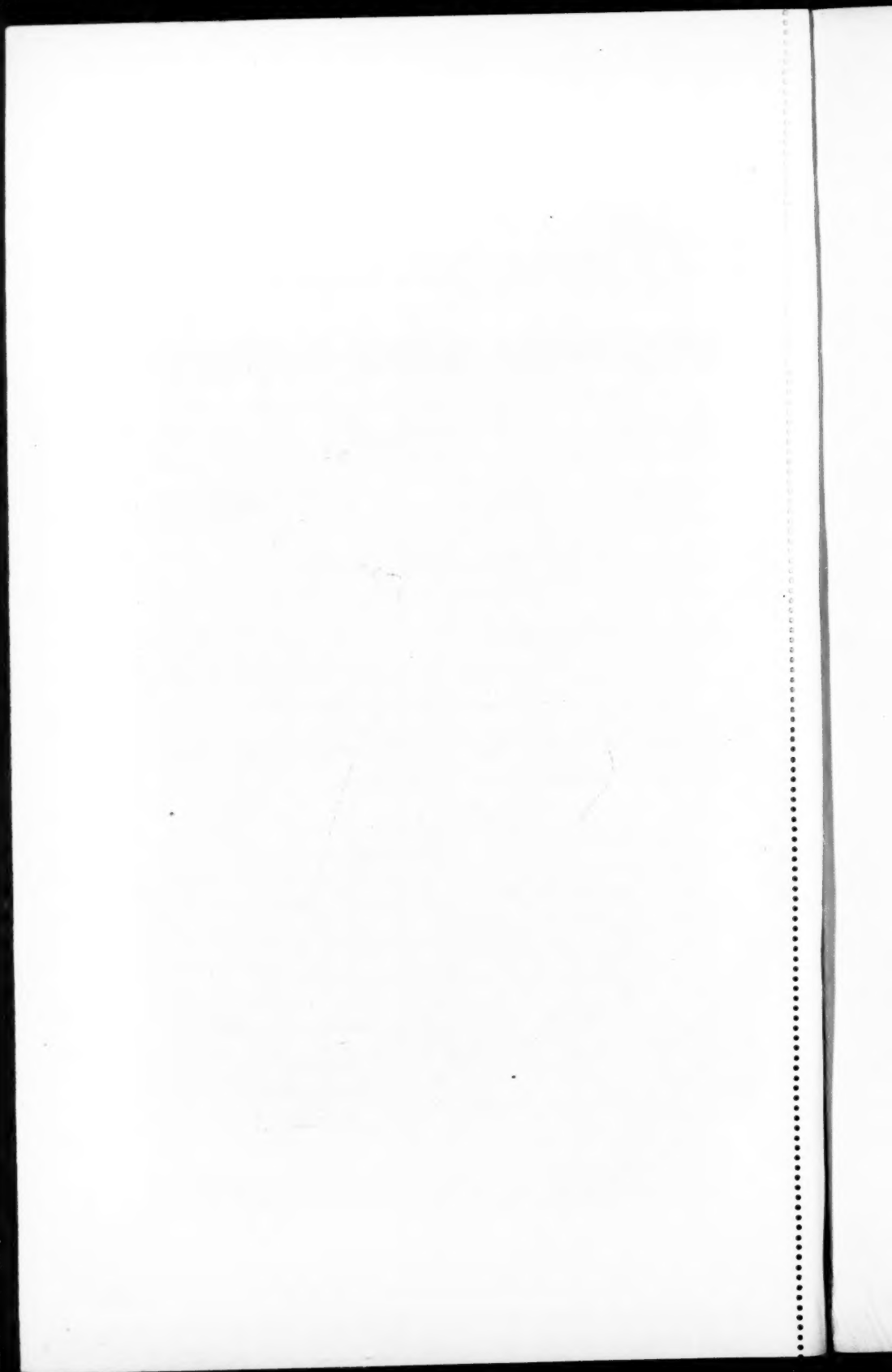


VIEW OF THE BANQUETING HOUSE, WHITEHALL, IN 1713.

King Charles I., on his way to the scaffold, passed out through the window above which a crown is marked.

From an Engraving by H. Tessaon in the British Museum.

Reproduced from "The Old Royal Palace of Whitehall," by the Rev. Canon Sheppard, D.D.



III. CHANGE OF ADDRESS OR RANK.

Notification of change of address or rank must reach the office not later than the 15th of the month for correction for the following Journal. Members are reminded that the change should be made in writing, and that the notice will be deemed to reach them through being wrongly addressed.

THE JOURNAL

OF THE

ROYAL UNITED SERVICE INSTITUTION.

Vol. LII.

SEPTEMBER, 1908.

No. 967.

[Authors alone are responsible for the contents of their respective Papers.]

SECRETARY'S NOTES.

I. OFFICERS JOINED.

The following officers joined the Institution during the month of August:—

Captain A. G. Wauchope, D.S.O., Royal Highlanders.

Lieutenant C. B. Grice-Hutchinson, R.H.A.

Major F. T. Higgins-Bernard, 3rd Bn. Oxfordshire Light Infantry.

II. ARMY PROMOTION LECTURES.

1. Military History.
2. Military Law.
3. Administration and Organisation.

1. A course of ten lectures in Military History on "Grant in Virginia, 3rd May to 30th June, 1864," set for the November Promotion Examination, will be given on Tuesdays and Fridays at 4 p.m., commencing on 13th October, the lecturer being Mr. J. H. Anderson, F.R. Hist. Soc., Barrister-at-Law.

2. A course of eight lectures in Military Law will be given on Mondays and Thursdays, commencing on 19th October, at 4 p.m., the lecturer being Lieut.-Colonel F. J. Tidy.

3. A course of eight lectures in Administration and Organisation will be given on Mondays and Thursdays, at 5.30 p.m., commencing on 19th October, the lecturer being Captain G. P. A. Phillips, R.E. (s.r.)

The fee for attending each course of lectures is one guinea for members of the Institution, and two guineas for non-members.

Applications to attend, enclosing the fee, should be addressed to the Secretary, Royal United Service Institution, Whitehall, S.W.

III. CHANGE OF ADDRESS OR RANK.

Notification of change of address or rank must reach this office not later than the 7th of the month for correction for the following JOURNAL. Members are reminded that it is essential that such changes should be made in writing; if these changes be not notified, members will be themselves responsible if their JOURNAL fail to reach them through being wrongly addressed.

IV. SPECIAL RESERVE AND TERRITORIAL ARMY.

Officers of the above Forces are eligible for membership of the Institution. The Council have had under consideration the alteration of the Bye-Laws owing to the abolition of the Militia and Volunteer Forces, and the creation of the Special Reserve and Territorial Army, and resolutions have been prepared making the necessary alterations. Under the terms of the Royal Charter, all alterations of Bye-Laws must be passed by the Annual General Meeting of the Institution. It is, therefore, not possible to effect the change until that meeting is held. The meeting in question, under the Bye-Laws, takes place on the first Tuesday in March each year.

Officers of the Special Reserve and Territorial Army are informed that it has been found quite impossible to alter the change of designation of their corps and battalions until the Official Army List has been completed in this particular. As soon as this is done, the alterations will be made.

V. ADDITIONS TO THE MUSEUM.

1. A large Coloured Plan of the taking of Quebec. (Contemporary.)

Given.

2. A Print in Colours of the Second Regiment of the Royal East India Volunteers receiving Colours at Lords Cricket Ground on 27th of July, 1797.

3. Cap Badge of the 23rd Regiment, as worn by the rank and file prior to 1881.

Given by Major S. Willcock.

4. Cap Badge of the 43rd Light Infantry, as worn by the rank and file prior to the year 1881.

Given by Colonel P. T. Clark.

5. A Painting in Oils of an East Indiaman coming into port; date about 1780.

Given by O. Chadwick, Esq., C.M.G., late R.E.

6. A French account of the Battle of Trafalgar (Contemporary), together with a Signed Plan of the Dispositions of the ships at noon.

Lent by Rev. R. P. Barron.

7. Secret Memorandum, dated "Victory off Cadiz, 9th October, 1805," signed by Lord Nelson, and circulated to the captains of ships before the Battle of Trafalgar. This particular copy was issued to Captain W. Lechmere, of H.M.S. *Thunderer*. The document bears the words: "When the *Thunderer* quits the fleet for England, you are to return this secret mem. to the *Victory*."

Lent by Rev. R. P. Barron.

¹ Badges of the following regiments are still deficient: 4th, 21st, 26th, 33rd, 67th, 68th, 71st, 76th, 77th, 81st, 87th, 101st, and 104th.

WHITEHALL PALACE AND THE EXECUTION OF KING CHARLES I.

By the Rev. Canon EDGAR SHEPPARD, C.V.O., D.D.,
Sub-Dean of His Majesty's Chapels Royal.

On Wednesday, 27th November, 1907.

Major-General Sir G. H. MARSHALL, K.C.B., in the Chair.

TO the Londoner there is but one Whitehall. He conceives of it vaguely as the historic district where, in old days, that memorable scene of the beheading of Charles I.—with which we hope to deal later on—took place. But, for all that, there are many Whitehalls in the land. Whitehall is a term still associated with all the Royal Palaces in England, as well as with many old castles, and, historically, with the place of assembly for Peers in Parliament. In the case, however, of the Royal Palace of Whitehall, the title has been, so to speak, specialised. The name of the part has been extended to the whole, and what was once York House, has, since the days of Henry VIII., enjoyed the proud distinction of being the Whitehall of all the palaces.

The question naturally arises to all of us, why the name was changed, and when? But it is, unfortunately, not easy to decide either the occasion or the date of the change. But this we know, the term Whitehall was certainly not in general use, in this connection, until the reign of Queen Elizabeth, and its use, as an official designation of the Palace, dates from the beginning of the reign of James I.

For many years under the name of York House, or York Place, the Palace was the London residence of the Archbishops of York. It was part of the patrimony of the See and parcel of the inheritance of the Archbishops. There is no doubt, as we shall show, that Cardinal Wolsey, during his tenure of the See and his residence at York Place, built, or re-built, a considerable portion of the Palace. Certain writers have, therefore, been made to make the deduction, that it was he who also re-named it, and that the new title of Whitehall was suggested to him by the fresh appearance of the new work, as compared with the older buildings in the vicinity.

The question, however, still comes, "If Wolsey did not alter the name of York House, who did?"

If we turn now to various authorities, we shall find our question answered plainly enough. From the Shakespeare Society Papers we learn that Whitehall was originally called York House, was delivered and demised to the King by Charter, February 7th, 1529 (21st Henry 8) on the disgrace of Cardinal Wolsey, Archbishop of York, and was then first called Whitehall—by order of the King.

If we seek a reason for this change of name, we shall find it, we may be allowed to conjecture, in the circumstances of that impressive catastrophe of human greatness—the fall of Cardinal Wolsey.

The splendour of York Place had been the outward and visible sign of the greatness and influence of Wolsey. The depth of his fall was to be signified by the erasure of the very name of his Palace from the annals of history.

Such, at any rate, is the impression that Shakespeare's treatment of the matter seems to convey—such the reflection we may be allowed to perceive in his mirror of the public mind. For in his play of "Henry VIII.," he causes one of the interlocutors, in describing Queen Anne Boleyn's Coronation, to say:

"So she parted.

And with the same full state paced back again
To York Place, where the feast is held!"

To this the following reply is made:

"Sir,

You must no more call it York Place: that's past:

For since the Cardinal fell, that title's lost;

'Tis now the King's, and called Whitehall."

The Palace of Whitehall was erected upon a site originally occupied by a large mansion, built in the year 1240, in the reign of Henry III., by Hubert, or Hugo de Burgh, Earl of Kent, and Lord Chief Justice, or as some old books have it, "Chief Justiciary" of England. In consideration of a certain number of silver marks and a yearly tribute of a wax taper of 3 lbs. weight on the Feast of St. Edward, the monks of Westminster granted to this Hubert de Burgh the inheritance of certain houses, with a court and a free chapel within the liberties of Westminster, in which to hold services for himself and his family.

This Hubert de Burgh seems to have made a vow to go to the Holy Land to fight the Infidel. This vow he was unable to fulfil, owing to his death, which occurred in the year 1242. He therefore left his property of Whitehall to the Church of the Black Friars, near Oldbourne, or Holborn, where he was buried. His instructions were that the Whitehall property should be sold and that the money should be employed in defraying the expense of an expedition to the Holy Land.

Matthew Paris, however, describes the transaction somewhat differently. According to him, Hubert sold the property

to the Friars Predicant, and among other things his noble Palace.

Whatever the true version of the business may have been, the Palace certainly came into the possession of the Friars Predicant, whose proper designation was the Preaching or Black Friars, and who are more widely known—at the present day—as the Dominicans.

In the year 1248 they sold the Palace to Walter de Grey, Archbishop of York, who died in 1255, and from that time until the fall of Cardinal Wolsey—a period of nearly three centuries—it was the London residence of the occupants of the See of York, thirty of whom dwelt there in their official capacity. The building was accordingly known, during that period, as York House. A Palace fit for a Bishop was, in those days, a Palace fit for a King. We are, therefore, not surprised to find that at Easter, 1360, the King (Edward III.) and his Parliament assembled here, and twice York Place was the lodging of King Edward I. and his Queen.

It was, however, during the residence of Cardinal Wolsey that York Place began to be invested with that splendour which is usually associated in our minds with the word Palace. That Wolsey built a great part of the Palace, including a hall and a chapel, we learn from several authorities, among others, from Fiddes' "Life of Wolsey," and also from Cavendish, who was not only the Cardinal's biographer, but also his Gentleman Usher.

The Palace, we are told, was at this time distinguished by a sumptuous magnificence that most probably has never been equalled in the house of any other English subject, or surpassed in the Palaces of many of its Kings.

Wolsey was the last Archbishop who occupied York House. Upon his disgrace in 1529, it was delivered to the King by Charter, and in the summer of 1536 another act was passed which annexed it to the ancient Palace of Westminster, whereupon, according to Brayley, the King changed the name and called it the King's Manor of Westminster and no more Yorke Place.

The acquisition was a very convenient one, for not only had the old Palace of the King—in the Palace Yard at Westminster—fallen into decay and ruin, but the Court was without any residence in that quarter, where its seat was usually held. In Whitehall then—after various alterations and buildings had been completed—the King fixed his Royal residence, and it was the dwelling place of his successors till the disastrous fire in 1698.

To the honour of so great a Prince, the mere property of Whitehall, consisting of the few acres which had passed from Hubert de Burgh to the Preaching Friars, and from them to the See of York, was far from satisfying. King Henry, therefore, obtained a grant in 1532 from the Abbot of Westminster of some large possessions. In view of these acquisitions, it will be readily understood that the Palace, which resulted from the

architectural efforts of Cardinal Wolsey and Henry VIII., appears to have been surprisingly extensive. A plan of it is engraved by Vertue, from a survey made in 1680 by one Fisher, and the space it there covers, including, of course, many courtyards and areas, is upwards of 23 acres. A copy of the map is at the office of Woods. The new Palace designed by Inigo Jones would have covered nearly 24 acres.

The Royal mansion extended—so we are told—from Scotland Yard on the north, to Cannon Row and the top of Downing Street on the south, and east and west from the Thames to St. James's Park.

Whitehall Palace was in the Tudor style of architecture. It included a gallery, which the King threw across the street, a cockpit, a tennis court, which stood on the site of the present Treasury buildings, and other buildings for various kinds of amusements; a beautiful gate alongside the Banqueting House and a magnificent gallery which ran northward to Charing Cross. King Henry also built a chapel and a spacious room for entertainments.

The site of that portion of the building which faced the river is occupied, at the present day, by Whitehall Gardens, Montagu House, and the Board of Trade.

The two Gates—the Whitehall Gate and the King Street Gate—that stood south of Whitehall and north of King Street, and to which reference will be made afterwards, were necessary on account of the old right of way between Charing Cross and Westminster, which ran through the grounds of Whitehall Palace.

Very little was done to improve the Palace in the reigns of Edward VI., Mary I., and Queen Elizabeth, but the last-named sovereign is known to have built what Stow called "the old rotten slight-built Banqueting House."

The Palace had fallen into a dilapidated condition in the time of James I. and the King thought it desirable to rebuild it on a magnificent scale. For this purpose he secured the services of Inigo Jones, who, by the bye, was appointed Surveyor General on October 1st, 1613. The only part of the plan that was carried out, however, was the Banqueting House, a circumstance owing, it is stated, to the immense extravagance of the Court.

If this design of Inigo Jones had been carried out the Palace would have extended in length 1,152 feet on the bank of the Thames N. and S., and 874 feet E. and W. The front, facing the river, was to have been raised on piles, running a great distance into the water. It was Jones's intention that the Palace should have four fronts with square towers at the angles, a large central quadrangle 245 feet square, oblong in shape, and six smaller quadrangles. The central of the three side courts on the west, lying towards the river, was to have two corridors surrounding it, and the Persian Court or Circus on the east, in diameter 210 feet in the plan, consisted of an arcade with figures of Persians between the arches, and an upper storey, the

entablature of which was supported by caryatides, fountains, statues of marble and bronze, a broad water terrace, and flower gardens were designed to fill up the whole magnificent composition.

It is a curious fact that Inigo Jones made three sets of designs for the rebuilding of Whitehall Palace, all of which differ from one another. The originals, it may be added, were in November, 1716, in the possession of Dr. Clarke, of All Saints', Oxford, who, at his death, bequeathed them to the Library of Worcester College, Oxford.

Charles I., on his accession, is said to have contemplated a reconstruction of the Palace of Whitehall. He employed, we know, Rubens to paint the ceiling, and he intended to commission Vandyck to paint the walls of the Banqueting Hall. But, so far as the building was concerned, he does not seem to have accomplished very much, partly on account of his poverty and partly, in all probability, because of the outbreak of the Civil Wars. Mention, however, is made in the "Strafford Papers" of a great room which was built by the King for the performance of masques that coming winter.

After the Restoration Sir Christopher Wren was commissioned to make sets of designs for the rebuilding of the Palace. They were three in number: one set of three he drew up in the reign of Charles II., and the other two sets in the time of William and Mary, after the fire in 1698. But though these first designs were put in hand Charles II. took no further steps in the matter of remodelling the Palace, which was of immense size in his days.

James II., on his accession to the Throne, at once began to make various additions to and alterations and improvements in the Palace, all of which were completed in the following year.

When William III. succeeded to the Throne he seriously thought of rebuilding the Palace after the designs of Inigo Jones, and it seems, according to Strype, that a certain Mr. Weedon was commissioned to make a model of the latter that might be placed before the King.

Nothing, however, was done in the matter, although for many years the various leases granted of parts of the Palace contained power to resume possession in the event of a rebuilding of the Palace being begun. But it was during this reign that an embankment called Queen Mary's Terrace was made behind the Palace. This embankment is shown on a plan which belongs to the year 1773. The Palace remained as it was till the disastrous fire in 1698, which almost completely destroyed it. With the fall of the House of Stuart, therefore, the old Palace of Whitehall ceased practically to exist.

The Banqueting House, or Hall, is the only important portion of this famous Palace that now exists. There is no building in London, I venture to think, more sentimentally and historically connected with the life of the nation, and it is strange to reflect upon the various uses to which it has been put in the course of its existence. Installations, masques and

other ceremonies have from time to time taken place within its walls. In the reign of Charles II. it was the scene of a sale of the famous collection of pictures of the Duke of Mantua. Upon the accession of George I. it was converted into a Chapel Royal and was used as such for the performance of Divine service till the autumn of the year 1890, when it was lent by Her late Majesty Queen Victoria to the Royal United Service Institution.

This present Banqueting House (which must not be confused with the Banqueting House which Queen Elizabeth added to the Palace, and which existed till 1606) was begun in the year 1619, soon after a great fire which broke out and which, according to Stow, "raged from end to end and side to side of the Palace before it was discerned."

This Banqueting House was completed within the space of three years, at a cost of £14,940 4s. It was part of a design intended to cover a space of 1,152 feet by 874 feet, and it was the only portion of King James's vast scheme for rebuilding Whitehall Palace which was ever carried out. This Hall therefore, to quote an old historian, "besides being the sole relic of a Whitehall that never existed, is also the sole relic of the Whitehall that was."

The architectural merits of that beautiful relic were immediately recognised and have never, we fancy, been disputed.

A lofty gallery runs along the two sides and across the end of the Hall, which is 115 feet in length, 60 feet in breadth, and 55 feet in height. But, of course, the chief point of interest in the interior of the building is the ceiling, for which Charles I., at the beginning of his reign in 1630, employed the services of Rubens, who had been sent to England by the Infanta Isabella as Ambassador from Flanders.

Rubens was paid £3,000 for the work, in which, according to Sir Godfrey Kneller, he was assisted by Jordaens. The sketches were made in England, probably upon the spot, but the actual painting was executed and completed in Antwerp in the year 1635. Some writers have thought that Rubens painted the ceiling in the reign of James I., but there can be little doubt that it was executed in the reign of Charles I., who not only paid the artist for the work, but also knighted him.

It is a fact, as interesting to learn as it is tantalising to reflect upon, that Charles I. was in treaty with Vandyck to paint on the walls of this chapel the history of the Order of the Garter, but death prevented that artist from entering on his task, as the outbreak of the Civil War would have prevented him from completing it or being paid for it, had he lived. It was estimated that the commission would have necessitated an outlay of £80,000, and even under the most favourable conditions there would have been some difficulty in paying so huge a bill.

This ceiling is painted black, partly gilded and divided into panels by bands ornamented with a *guilloche*. Of the three

central compartments one represents the British Solomon on his Throne, pointing to Prince Charles, who is being perfected by Wisdom. The middle compartment shows him trampling on the Globe and flying on the wings of Justice (an eagle) to Heaven, and in the third he is embracing Minerva and routing Rebellion and Envy.

The ceiling has been restored on five occasions. In the reign of George III. it was renovated by Kent, and in the year 1785 by Cipriani, who—according to Pennant—received £2,000 for his work; while in 1837 the whole building, which had been closed since 1829—upwards of eight years—was entirely repaired, at a cost, it is said, of nearly £15,000, the ceiling being restored under the direction of Sir Robert Smirke. In the course of this restoration, a gallery which had been built for the use of the Guards was removed.

James II. placed a large weathercock, surmounted by a cross, on the roof at the north end of this Banqueting House, opposite his own private apartments, in order that he might learn the direction of the wind, while he was dreading the approach of the Dutch fleet, under the Prince of Orange. The weathercock still remains in its position, but the cross is no longer there.

Upon the accession of George I. in 1724, the Banqueting Hall was converted into a chapel, and His Majesty attended the opening ceremony himself. Divine Service was held there regularly until the year 1891 without interruption, if we except the years 1829-1837, when the building was temporarily closed.

The reason for the conversion of the Banqueting House into a chapel may be traced to the exigencies created by the Great Fire of London.

When the Hall was put to its new use, the need of windows on the front floor made itself felt for the first time. Hitherto only the centre window on the east side had been opened. As late as 1761 the third and fifth were still built up. It was probably not till 1830, when the Hall was restored by Sir John Soane, that all the windows on the west side were opened, except those on the ground-floor. The ground-floor windows were opened first for the United Service Institution. The statement was current on this occasion that they were merely being re-opened. But the statement was inaccurate, for, as a matter of fact, they had never been opened before.

At the beginning of the last century, Whitehall Chapel was the scene of one of those ceremonies which mark the close connection between our Church and State—between the Church Militant and the Nation at War. For we read in the *Gentleman's Magazine* that on Saturday, May 18th, 1811, twelve standards and colours, taken from the enemy on different occasions, including the French Eagle taken by the 87th Regiment at the Battle of Barrosa, were carried with military ceremonies from the Parade in St. James's Park to Whitehall Chapel and deposited on each side of the altar. The spectacle, which was one of the finest ever witnessed, was attended by the Dukes of

York and Cambridge, Sir R. Dundas, Generals Hope, Doyle, Calvert, and Phipps; the Spanish and Portuguese Ministers, besides a number of ladies of distinction. Again, on September 30th of the following year, 1812, other French Eagles, captured at Salamanca, were placed, with military and appropriate ceremony, in the Royal Chapel at Whitehall.

Here the colours remained till the closing of the Chapel in 1829, when they were removed to Wellington Barracks, where they are still to be seen.

After the restoration of this Chapel at Whitehall, in 1837, William IV. and Queen Adelaide attended the opening service in State, and this was the last time that His Majesty appeared at Divine Service in public.

In July, 1890, the Chapel Royal Commissioners asked Her late Majesty's permission to discontinue Whitehall Chapel as a place of worship, and Lord George Hamilton, who was then in office, wrote to say that the Government would be glad to have the use of the building as a future home for the United Service Museum. The Commissioners, however, decided that they were not competent to offer an opinion as to the disposal or future use of the building, if it were no longer used as a Chapel.

In October, 1890, Sir Henry Ponsonby, Private Secretary to Queen Victoria, wrote that Her Majesty approved the recommendation of the Commissioners, and sanctioned the closing of the Chapel. At the same time he informed them that Her Majesty was "glad to lend"—from January 1st, 1891—"the Banqueting Hall to the United Service Institution on such terms as the Lord Chamberlain might consider advisable."

The organ was given, on the closing of the Chapel, to the Chapel of St. Peter ad Vincula, in the Tower of London. Some of the stops, however, were taken from it and added to the organ at the Chapel Royal, St. James's.

Upon coming into possession of the Banqueting House, the Royal United Service Institution added a new building on the south side, the foundation stone of which was laid by the Prince of Wales, our present King, on June 6th, 1893.

Reference—as we pass along—must now be made to the Gateways of Whitehall Palace. They were two in number, the Holbein Gateway and the King's Gate.

The Holbein Gateway is generally supposed to have been situated near to Charing Cross, and it was also called the Whitehall Gate and the Cockpit Gate. It was one of Henry VIIIth's additions to Whitehall, and it connected the Tennis Courts, the Cock-pit, and the Bowling Green with the Palace, besides providing the King with a gallery into the Park, where he could witness the sports which took place there on special occasions. It was designed by Hans Holbein, who had entered the service of the King and been assigned a suite of apartments in the precincts of the Palace, together with an annual salary of 200 florins.

This celebrated gateway, which was in the Tudor style of architecture, with battlements and four lofty towers, stood on a

line with the south end of the Banqueting House, and was built with bricks of two colours, glazed and disposed in a tessellated fashion. On each front were four busts, in baked clay, which resisted to the last every attack of the weather. Pennant, who had seen the Gate, tells us these busts were of Italian workmanship, and were attributed by some people to Torrigiano, who erected the monument of King Henry VIII. in Westminster. Two of these four busts are now at Hampton Court.

Strype says that at one time—and for a considerable period—the uppermost room in Holbein's Gateway was used as the State Paper Office. The structure, which had outlived all the adjoining buildings, except the Banqueting House, was then pulled down in 1795, in order to widen the street, viz., Parliament Street, and the busts and medallions were dispersed.

On the taking down of this Gate it was begged, and obtained by William, Duke of Cumberland (son of George II.), then Ranger of Windsor Park and Forest, with the intention to erect it at the end of the Long Walk. The stones of the Gate were accordingly removed, but the intention of erecting it at the end of the Long Walk not taking effect, they were, many of them, by the Duke's direction, worked up by a Mr. Slingsby, stone mason to the King, in several different buildings erected by the Duke in the Great Park there.

The second of these two Gates was called the King's Gate. This Gate was in the Gothic style of architecture, and was built of stone. It was erected at the same time as the Holbein Gate, to which it was far inferior in beauty. It was situated at the north end of King Street and Old Scotland Yard, which originally ran from Charing Cross and Whitehall to the King's Palace at Westminster. The structure had four towers in the Tudor style, and the south side was adorned—according to Smith in his "Antiquities of Westminster"—with pilasters and entablature of the Ionic order. There were also busts made in biscuit ware, of white clay, glazed like potters' ware. This gate was removed in the year 1723, and no record as to what became of it seems to exist.

The Privy Garden of the time of Charles II. covered an area of $3\frac{1}{2}$ acres, and was situated in the rear of the Banqueting House, upon a site now occupied by Whitehall Gardens. The Spring Garden was situated at the east end of the Mall between St. James's Park and Charing Cross, and it was laid out in the time of James I., and was so named after a spring of water which once existed on the spot. Charles I., it will be remembered, when on his way to the scaffold, pointed out to Bishop Juxon a tree in the Spring Garden as having been planted by his brother, Prince Henry. After the execution of the King, and during the Protectorate of Cromwell, the garden was closed to the public.

When Charles II. came to the Throne Spring Garden was called "Old Spring Gardens." It was encroached upon for building purposes soon after the Restoration, and the ground, when built upon, was, according to the rate book of St. Martin's-

in-the-Fields, divided into "Inner Spring Garden" and "Outer Spring Garden."

I am afraid, with the limited time at my disposal, that it will not be possible, with any satisfactory result, to touch upon the Royal and other residents within the walls of Whitehall Palace, nor upon the marriages and deaths which from time to time took place there—to say nothing of the ceremonies and masques, the pictures and art treasures, and the Royal Maundy, and many domestic details of great interest.

We must therefore pass on to that all-absorbing and fascinating subject, Charles I., and the site of his execution.

There is a story told of the late Lord Beaconsfield which, whether it be apocryphal or not, is well worth repeating at the outset of the present discussion. One of his supporters once asked him to give a word of advice to his boy. The statesman groaned, but consented. "My young friend," he said in his most impressive manner to the lad, "your father has asked me to give you some advice, which may be of service to you all your life. Never then ask who wrote the 'Letters of Junius,' or on which side of Whitehall Charles I. was beheaded, for if you do you will be considered a bore, and that is something too dreadful for you at your tender age to understand." Yet in spite of the advice of that great wit, these questions have never been allowed to lie dormant.

Only a few years ago the site of the execution of King Charles I. was once more the subject of prolonged controversy in the papers, and in the course of that controversy many writers engaged with natural enjoyment in pointing out the mistakes of others. The spot at which King Charles emerged from the Banqueting House was, it was shown once more, a source of much grievous error, for some writers asserted that the Royal martyr passed through a particular window of that building, whilst others maintained that certain portions of its brickwork were removed in order to allow of his passage.

Where doctors disagree it is, we know, difficult to decide, but again, in spite of Lord Beaconsfield's warning, I shall endeavour at any rate to place before you now the evidence on which they disagree, and to emphasise the view which appeals to me, in my humble opinion, as most probable.

Of the several points of detail in dispute we shall deal first with the position of the scaffold upon which the King was beheaded.

The late Sir Reginald Palgrave, an eminent authority upon the subject, quoted written evidence which, so far as is known, had hitherto been unpublished. The late Mr. Thoms, Librarian to the House of Lords, was Sir Reginald's informant, and he told him that some years previously he had been shown a stone which had been placed in the ground in front of the Banqueting House in order to mark the site of King Charles's execution.

This evidence is corroborated by Mr. Hugh Owen, who says that he also, as late as the year 1831, when arriving in

London was taken to see this very same stone, which, to quote his own words, "was under either the second or third window of Whitehall, next to Charing Cross, and my memory," he added, "inclines most to the second window."

So much for the evidence of modern tradition. Let us now examine the writings of well-known men of the time, with the object of testing the correctness of this evidence.

All the prints of the execution published at the time show that the scaffold upon which the King was beheaded was erected in front and *not* at the end of the Banqueting House. The warrant for the execution, and this is a very important point to notice, prescribes that the King should be beheaded "in the open street before Whitehall." In other words, the execution was decreed to take place, and therefore, *a priori*, we might assume *did* take place in the wide open space between the Banqueting House and the tilt yard through which the public traffic took its course between Westminster and Charing Cross. And in this natural assumption we are also borne out by the evidence of contemporary witnesses. For whatever doubt may exist as to the particular window in front of which the scaffold was erected, we have it on the strength of the records left us, both by Lord Leicester and Dugdale, that that structure faced the Horse Guards and the Park. The former asserts in his "Journal" that the King was beheaded at "Whitehall Gate," and the latter in his "Diary" that he was "beheaded at the Gate of Whitehall."

Warwick in his "Memories of the reign of King Charles I.," says that the King "came out of the Banqueting House on to the scaffold," whilst in a pamphlet published at the time and entitled "King Charles, His Speech," the statement occurs that His Majesty "came through the Banqueting House, adjoining to which the scaffold was erected, between Whitehall Gate and the gate leading into the Gallery from St. James's." And if this is not enough, there may be seen at the British Museum a single sheet of the day, which also states that "the King was beheaded at Whitehall Gate."

The precise *position* of the scaffold, with reference to Whitehall, it is more difficult to determine. Dean Stanley's view, as recorded by the late Lord Carnarvon in a letter to the *Times*, May 12th, 1890, was that a "wooden passage was erected along the face of the Banqueting House of Whitehall, that the King, who had that same morning been brought across the Park to Whitehall, was led out through a window, which had been cut down at the east end of the building for that purpose; that he had passed along the wooden passage, and was beheaded on the scaffold *in front of the middle window*."

On the whole Mr. Hugh Owen's statement that the scaffold was placed under the second or third window, and that the second window seemed the more probable, would appear to be correct.

Correct, too, so far as it goes, is his *other* statement that a passage to admit the King to the scaffold had been made by

piercing the wall. For as to the fact that a passage of some sort was broken through some wall, we are left in little doubt by Sir Thomas Herbert, who, it will be remembered, attended the King in his last moments. "The King," he records in his touching "Memoirs," "was led along all the Galleries and Banqueting House, and *there was a passage broken through the wall, by which the King passed on to the scaffold.*"

The question which arises is this: Through which wall was the passage broken? "This passage," says Pennant at the time of writing, "still remains at the north end of the room, and is at present the door to a small additional building." That, I venture to believe, to be the true statement of the case. But assuming for a moment that the passage was, as many have maintained, cut in the western outer wall of the Banqueting House, as a means of direct egress to the scaffold, one or two difficulties suggest themselves with which it may be as well to deal at once. Why, in that case it might be asked, was the wall broken through at all? Why was not the King taken through one of the windows? A moment's reflection will reveal the fact that there was a good reason for not using any of the windows of the Banqueting House facing west. For if one of the lower windows had been used for the purpose, the scaffold would have been almost level with the heads of the crowd, and that might have been the cause of considerable danger in several ways. Again, there were at that time no glazed windows overlooking the street of Whitehall, or what was called the western front. All of them were built up, and in this condition, as I mentioned earlier in my lecture, the lowest tier remained till the year 1895. But even if the upper windows had been glazed, they were far too high up to be of use for the purpose of approaching the scaffold.

The lower windows then were too low to be used with safety. The upper windows were too high to be used with convenience. Other means, therefore, of arriving at the scaffold had to be devised.

Another slight difficulty has occurred to some minds. How, it is asked, did His Majesty make the ascent necessary to place him on a level with the scaffold? The answer is that the King reached the level of the aperture—whatever it was—through which he was destined to approach the scaffold, by means of the galleries within.

There are now two questions which remain to be considered. Through which window—if window at all—did King Charles approach the scaffold? And through which wall was it that a passage was broken on this occasion? Ludlow, in his "Memoirs," says that Charles "was conducted to the scaffold out of the window of the Banqueting House." At first sight this would seem to be confirmed by the following memorandum of Vertue's on the copy of Terrason's large engraving of the Banqueting House, dated 1713, preserved in the Library of the Society of Antiquaries. It is believed that the King, on his way to

the scaffold, came through the window, above which, in the print, a crown is marked. He says: "'Tis—according to the truest reports—said that out of this window King Charles went upon the scaffold to be beheaded, the window frame being taken out purposely to make the passage on to the scaffold, which is equal to the landing place of the Hall, either side."

But the window referred to by Vertue was part of a small building abutting from the north side of the present Banqueting House, and it was from this very window that the King stepped on to the scaffold. This is the view entertained by Sir Reginald Palgrave.

There are eight plates in the Library of Windsor Castle of the "Place and Execution of Charles I.," and all these prints show the execution as having taken place in Whitehall.

Speculations are very interesting, but interesting as they are, I venture to think we must base our solution of this mystery—for it can be called nothing else—upon the plain statement of Herbert in his "Memoirs." His words are as follows: "The King was led along all the galleries and Banqueting House, and there was a passage broken through the wall, by which the King passed to the scaffold."

I incline to the view that the King was executed under the second or third window of the Banqueting House, facing the Horse Guards, and that the window from which he stepped on to the scaffold was the one indicated in that view of Vertue's—a window, that is, in a small building abutting on the north side of the present Banqueting House. For I have tried to show that the windows in the Banqueting House itself were, by reason of their height, not suitable, and at the time with which we are concerned were not open. But there were no such objections to the windows in the small building adjoining the northern extremity of the Hall. It was in every way suitable, it was at the right elevation: it was open. If it were not large enough, its framework could easily be removed, and there would be no difficulty in connecting it with the scaffold, which was to be placed, as we know, "in the open street before Whitehall."

That the King reached the level of this window by means of the galleries within, may plainly be deduced from Herbert's narrative. But how did he pass into this small building from the Banqueting House? Here, again, Herbert offers us an easy exercise in deduction. "There was a passage," he says, "broken through the wall."

As a summing up of the results towards which the conflicting views and evidence, which I have ventured to put before you, tend, I cannot, I think, do better than quote the words of the late Sir Reginald Palgrave, who did so much to elucidate one of the most intricate and fascinating of the minor problems of history. In a letter to the *Times*, dated 17th May, 1890, after referring to Lord Carnarvon's view that the scaffold should, in accordance with Dean Stanley's view, be represented in Mr.

Ernest Croft's picture, as before the middle window of the building, he wrote as follows :—

"That this was, in the opinion of Dean Stanley, the position of the scaffold, I am aware. I maintain that the window in the west front of the Hall, second from the northern or Charing Cross end of the building, was 'King Charles's window.' This is the name given to that window by the first Dean of the Chapel, and the late Mr. Thoms, the eminent historical engineer, assured me that he had seen, in the pavement before that window, a memorial stone, placed there to mark the spot of the execution."

The correctness of Mr. Thoms' remembrance was confirmed by his friend, Mr. Hugh Owen, formerly Chief Cashier to the G.W. Railway, who wrote to him as follows :—

"On May 1st, 1831, I arrived in London as the guest of Benson Earle Hill. That afternoon, when we walked to see the Abbey, Hill showed me, in the foot pavement, a stone placed lozenge-wise. It was a blue stone, most likely slate or blue lias. He told me that it marked the site of the scaffold on which Charles I. was slaughtered. The stone was under the second or third window of Whitehall, next to Charing Cross. Of this point I am a little at a loss, but my memory inclines most to the second window, as the one it marked from which the scaffold was entered."

"In that notion," continues Sir Reginald, "Mr. Owen followed the general belief; but it was not through a window in the front of the Hall that Charles passed out on to the scaffold. A small building abutted against the north end of the Banqueting Hall, which, in height and shape, corresponded closely with the Georgian structure which contains the entrance staircase to Whitehall Chapel. From a window in the west front of that small building, in position very similar to the blank window above the present outer entrance door to the Chapel, the framework was removed, and the King was led through that aperture on to the Scaffold, which was carried round the front of the Hall as far as the second window."

"The King," he continues, "had reached that small building thus: He entered the Banqueting Hall by an outside staircase, which led up from the ground to one of the windows in its east, or river side. Having thus gained entrance, Charles walked down the length of the Banqueting Hall until he reached the north end wall, and before him was a doorway cut through the wall, giving entrance into a narrow room beyond, and then, when he stood within that room, the daylight streamed in upon him, through the dismantled window opening, and he saw the way to death. That passage-way, cut January 29-30, 1648, through the north wall of the Banqueting House, has never since been closed. It is the doorway now in use that gives access to Whitehall Chapel, a doorway, surely, as fateful as any in the world."

I am afraid that I have already exceeded the time allotted to me, and in fact, the length of time which I had mapped out for myself, so that it will not be possible for me to-day to deal with the execution of King Charles I.—the most important event in the history of Whitehall and one of the greatest tragedies in England.

I should like, however, in concluding this lecture, to assure the Council of this Institution how greatly I appreciate the honour which they have done me in asking me to undertake this pleasant duty this afternoon, and I should like also to be permitted to thank General Sir George Marshall for his kindness in presiding on this occasion.

THE object of my paper is to introduce to the military members of the Royal United Service Institution the new strategic theories of the French General Staff, and certain deductions following logically therefrom, which seem to me destined to exercise an absolutely revolutionary influence on the very foundations of all military teaching, both strategical and tactical.

Illustrative, though we have all been united in the belief that the "art of strategy," using the expression in its widest meaning, lay in the concentration of superior fighting power at the decisive point, and at the right time, and within the last few years no one has been able to formulate any system which should ensure the simultaneous fulfilment of the three conditions involved. Whatever the system followed, it was always possible that one's combination might bring superior forces to the wrong place at the right time or to the right place at the wrong time, or, though time and place were correctly chosen, the superior forces might fail to arrive.

Now, the essential feature of Napoleon's strategy is, that neither before nor since has any commander succeeded in solving this problem with such uniform success. But, and this is the extraordinary fact which needs explanation, though more has been written of his life and exploits than about any other man, not an inkling of the real secret of his success is to be found until the year 1805; and he himself seems to have taken his system so much as a matter of common-sense that he never attempted to explain it to the men to whom he had entrusted the execution of his designs.

Once our attention is called to this system it is absolutely states as in the fact; but I frankly confess that I might have gone on studying Napoleonic history to the day of my death.

THE DEVELOPMENT OF NAPOLEONIC STRATEGICAL AND TACTICAL METHODS, AS ILLUSTRATED BY THE BATTLE OF WATERLOO.

By Colonel F. N. MAUDE, C.B., *p.s.c.*, late Hampshire R.E. Vols. (late R.E.)

On Wednesday, 15th January, 1908.

Lieut.-General H. D. HUTCHINSON, C.S.I., in the Chair.

THE object of my paper is to introduce to the widely scattered members of the Royal United Service Institution the new strategic doctrine of the French General Staff, and certain deductions, following logically therefrom, which seem to me destined to exercise an absolutely revolutionary influence on the very foundations of all military teaching, both strategical and tactical.

Hitherto, though we have all been united in the belief that the "art of strategy," using the expression in its widest meaning, lay in the concentration of superior fighting power at the decisive point, and at the right time, until within the last few years no one has been able to formulate any system which should ensure the simultaneous fulfilment of the three conditions involved. Whatever the system followed, it was always possible that one's combination might bring superior forces to the *wrong* place at the *right* time or to the *right* place at the *wrong* time, or, though time and place were correctly chosen, the superior forces might fail to arrive.

Now, the essential feature of Napoleon's strategy is, that neither before nor since has any commander succeeded in solving this problem with such uniform success. *But*, and this is the extraordinary fact which needs explanation, though more has been written of his life and exploits than about any other man, not an inkling of the real secret of his success is to be found until the year 1896; and he himself seems to have taken his system so much as a matter of common-sense that he never attempted to explain it to the men to whom he had entrusted the execution of his designs.

Once our attention is called to this system it absolutely stares us in the face; but I frankly confess that I might have gone on studying Napoleonic history to the day of my death

without perceiving it, but for a chance encounter to which I feel it only right to allude in order that the credit for the introduction of this idea into this country should be given to the man to whom it rightfully belongs, Captain Charrier, of the Royal Munster Fusiliers.

In 1904 I had published a collection of essays, to which I gave the title "The Evolution of Modern Strategy," which met with such success in Germany and France that I fear my head had been a little turned. One day after delivering a lecture, I was introduced to Captain Charrier, and we soon got into conversation on "War" generally, when I presently discovered that he was talking far above my head, and introducing me to a world of thought to which I was an entire stranger. I was so much interested that under his guidance I re-studied and re-cast all my previously acquired material, and the result of this reconsideration I propose to lay before you to-day.

To understand how it was possible for a secret of such importance to remain hidden during these many years, it is necessary to review the nature of War as the French Revolution found it, and the military conditions under which Napoleon grew up.

Nearly a century of almost continuous fighting had stereotyped the general practice, and by a process of natural selection the long service armies of the Continent had evolved the forms best suited to their several environments. Experience when closely analysed showed that ready money—not credit—was the fundamental secret of success, and that that State could maintain the most efficient Army which "specialised" the two functions of production and protection, *i.e.*, left the tradesman and peasant free to develop trade and agriculture and kept the soldier exclusively to the work of war or preparation for its coming. The greater the prosperity of the nation the more men it could afford to pay for, and the more ceaselessly they were kept at work the more efficient they became and hence the fewer were needed for any specific task.

By degrees the standard of efficiency became so high that it took nearly two years' training to fit a recruit for the ranks, and by that time a sum of considerably over £100 had been spent upon him. He was therefore worth a considerable expenditure to preserve him against the dangers of prolonged marches, wet bivouacs and all the other vicissitudes of campaigning which play such havoc with the field states.

If the soldier felt himself neglected either in regard to food, clothing or other comforts he deserted to the other side. Hence each deserter, like an M.P., counted for two in a division—and hence again it became economically expedient to make his surroundings as comfortable as possible, which entailed providing him with tents on the march and further hampering operations generally by heavy convoys of supply.

When two such armies encountered one another in battle, because both were very efficient, the result was largely a matter

of chance, and always had to be paid for at a price in men's lives which, expressed in money alone, almost sufficed to bankrupt victor and vanquished alike, for credit being almost non-existent victory had no immediate effect in filling the conquerors' coffers. Whether he won or lost, a commander-in-chief had to reckon on the sacrifice of at least one-third of his army, and since the result, as already pointed out, was always most uncertain, all but the boldest shrank from accepting the risk, and this was the same in all armies.

When two generals, both trained to shirk responsibility, faced one another, war became essentially a duel between two commanders, in which strength of character decided. The weaker allowed himself to be frightened by manœuvres and stratagems out of the district he occupied, and the king who was fortunate enough to own the stronger general received a substantial addition to his rent roll by the annexation of a new province at no heavier outlay than would have been incurred had he kept his troops in barracks.

When a king in person entered the arena and recklessly threw away the lives of his subjects—as he had a divine right to do—it was felt that this was not playing the game, and whilst everyone admired him, no one ventured to imitate him, and, indeed, the king would have been both surprised and annoyed had anyone attempted to do so.

The following quotation from Rüchel's speech, in praise of Prince Henry of Brunswick, one of Frederick the Great's most trusted lieutenants, shows to what length this cult of the bloodless decision had attained:—

"By daring marches he flattered fortune—more fortunate than Cæsar at Dyrrhachium, than Condé at Rocroi, he gained, without a battle, the victory."¹ And if Rüchel, one of the most enterprising and ablest of the Prussian leaders at the close of the eighteenth century, was prepared to go to this extent, we can imagine the views of weaker men.

It was in Austria and Prussia that this cycle of cause and effect reached its fullest development. In both the Army was Royal, not national, and to criticise those in authority was disloyal, not merely inexpedient; but in France the spirit of unrest which culminated finally in the Revolution was already active throughout society, and in the years when Napoleon was growing up many pens were at work clamouring for a National Army and national ideals both in strategy and tactics.

Amongst these authors, Guibert stands out most conspicuously, his ideal of the causes for which a nation should fight, of the army which should fight for them, and the leader who should command it, form one of the most amazing instances of prophecy fulfilled in history. He foresaw the cessation of dynastic wars and the coming of a great national cause, for which men would be ready to die, and this change of motive

¹ See von der Goltz's "Rossbach und Jena."

led, as a necessary consequence, to a complete modification in the spirit in which operations would have to be conducted. What that spirit would be he did not attempt to define; but he took refuge in prophecy, and in the following words predicted the coming of Napoleon:

"Then there will arise a Man—hitherto lost in the obscurity of the crowd; one who has made his name neither by his words or by his writings. A Man who will have meditated in silence, and perhaps, ignorant of his own talent, has only felt its power whilst actually exercising it, and who has studied but very little. This Man will seize hold of opinions, of circumstances, and of fortune, and will say of the great theoretician what the practical architect said of the orator before the Athenians: 'All that my rival tells you I will carry out.'"

None of these writers had felt personally the pressure of great responsibility in war, and hence preached ideals of victory at any cost and the decisive battle as the culmination of strategical achievement, ideals which the experienced commanders, who had been through the ordeal of being called on to account, by an angry king or furious cabinet, for undue temerity in their pursuit, felt to be too theoretical to waste time in discussing.

These experienced men, however, were swept away at the very commencement of the struggle, and their successors, already imbued with the new ideals, were held to their realisation by public opinion, which found its expression in the "Guillotine Field Service Mark I," a humane substitute for the modern court of inquiry, presided over by the Press and Parliament, which substitutes lifelong torture for capital punishment.

Fortunately other causes were also at work to render the attainment of these ideals more readily practicable. The poverty of the French Exchequer compelled the troops to take the field stripped of all the heavy impedimenta which hampered the march of their adversaries, and since large and closely concentrated forces could not find food enough within the limits of the ground they actually occupied, they had to be scattered to live, and from this necessity arose the concession of relative independence to subordinate commanders, culminating in the formation of Divisions, and ultimately Army Corps as units complete in themselves under the direct and personal influence of their commanders.

Free from the necessity of conveying vast supplies of food, and thereby rendered relatively independent of roads, these little commands could traverse districts hitherto deemed impracticable by regular armies, and moving thus on a broad front, when contact with the enemy ensued, the troops were already placed in position for immediate tactical turning manœuvres, the advantage of which had always been under-

1 "Traité de grand tactique," 1778.

stood in theory, and only not employed in practice because of the difficulties and delays that arose in their application.

To meet them, their adversaries had recourse to the same methods to which we were compelled to resort in South Africa, viz., small brigade columns, whose movements, without the aid of a trained staff and field telegraphs, it was most difficult to co-ordinate, and the French met this method by a still greater extension of front, so that battles degenerated into straggling encounters of detachments over many miles of front, out of which no great decision could possibly arise.

This was the general state of affairs when Napoleon received his first command, and he proceeded to exploit to the utmost the advantages the superior initiative of his subordinates and the greater mobility of their troops conferred upon him, but he devised no new methods, every one which he employed can be found in the works from which he in common with his contemporaries had derived their education, viz., in Guibert, Bos Roger, Lloyd, du Teil, etc. He concentrated "masses" upon detachments, but the "masses" extended widely to fight, and of the combination of the three arms only the indication is apparent because, technically, his artillery and cavalry were not yet sufficiently evolved for the execution of his designs. Boldness of conception and tenacity of purpose are the essential characteristics of his early campaigns, and he won because his enemies could not realise that with the means the Revolution had conferred upon him such feats were possible of achievement.

In Italy, however, he had only small numbers of men to handle, and with a friendly population to help him strategic information was rarely lacking. It was otherwise, however, with tactical intelligence, and his narrow escape at Marengo must have brought home to him the absolute need of a cavalry screen to give timely notice of the enemy's presence. This idea he developed to its fullest extent in the campaign of Ulm; incidentally discovering also its limitations. His cavalry swept the ground for fifty miles in front of his marching columns and located the Austrians in Ulm with great exactitude, but they could not tell him where the Austrians were going to be by the time the Army arrived—and Napoleon himself could not conceive what they actually did.

His march, therefore, based on cavalry reports, proved a blow in the air, and at an infinite strain on the endurance of his men he was compelled to wheel his whole army round a semi-circle, exposing, of course, his communications by so doing, in order to hunt down the Austrians to their lair.

We know now, it was impossible for him to know then, that it was only due to a sequence of causes, each in itself entirely unpredictable, that Mack was still in Ulm when the French arrived. Had he marched out to the north-eastward during the three days the road lay practically open for his retreat, the resulting fiasco would have been too enormous to be explained away even in the columns of the *Moniteur*, and the Emperor's

prestige would have suffered an injury impossible to retrieve—180,000 Frenchmen under Napoleon converging on an empty trap would have been an anti-climax, which no reputation could have endured.

The chief difficulty in war, Clausewitz tells us, arises from the "independent will-power of the enemy," and it was this difficulty Napoleon now set himself to overcome. The solution we find in the campaign of Jena. Here it was at the outset quite impossible to predict what the enemy might elect to do if left free to follow his own inclinations, but from the general political situation it was certain that he could not allow Berlin to fall into Napoleon's hands without a battle to save it. Napoleon therefore marched by the shortest line for his enemy's capital, and being unable to foretell from what direction the enemy might attempt to hinder him, he marched in what he called *bataillon carrée*—a battalion square of 200,000 men ready to fight in any direction at shortest notice. Obviously the phrase was but a figure of speech, for 200,000 men need rather more handling than a battalion square—but the underlying idea was there. The army in its march took the form of a lozenge—as shown in the diagram. The corps, 60,000 men, forming an advance guard for the whole army, 60,000 more on either flank forming the sides of the square, and the remainder the rear face and reserve—the cavalry preceding and flanking the march, but only for security, not primarily for intelligence.

It will be evident that in this order the French had nothing to fear, if the whole Prussian army attacked either in front or on either flank. 60,000 French, *with room to manœuvre*, could not be overwhelmed before the remainder of the army could swing in, and if the Prussians stood to receive the French, the attack of 60,000 men would sufficiently hold their attention to enable Napoleon to manœuvre the remainder at his pleasure. This is the whole meaning of Napoleon's favourite phrase: "one can only manœuvre about a fixed point." The first point of collision becomes the fixed point, and as long as it remains so the rest of the army can pivot on it either way, but the essence of the matter is that action at this first point of collision must be so vigorous and well maintained, hence "offensive" in character, that the "independent will-power of the adversary" is paralysed. Cavalry alone could not, then, exercise this holding power, hence the "general advance guard" became a powerful army, not less than a quarter the strength of the whole, with the permanent mission under all circumstances to fight to extinction to gain the time necessary for the decisive manœuvre.

From this method there was literally no escape except by retreat, as subsequent events were to show, but retreats require time which in practice appears to increase almost in geometrical proportion to the numbers engaged, hence in 1813 we find Napoleon resorting to every artifice to induce his enemy to delay the commencement of his retreat as long as possible, whilst himself devising tactical methods capable of achieving victory in the shortest time.

Ultimately we find him, as at Leipzig, sacrificing every consideration of strategic security to the one object of inducing his adversary to stand to receive his attack, for victory on the battle-field cancelled all previous strategic entanglements.

We must now turn to the tactical methods which had evolved themselves under the Emperor's guidance. Up to Austerlitz and Jena the French infantry had been the predominant arm, to which artillery and cavalry were only auxiliaries, but during the campaigns in Poland the infantry and cavalry began to deteriorate whilst the artillery gradually improved, not so much in battery efficiency as in the capacity of its chiefs to handle large masses.

The idea of concentrating numbers of guns to form a breach in the enemy's line was the keystone of the theories of Guibert and du Teil, in which school (du Teil was his colonel at Valence) Napoleon had been brought up; but hitherto not only had there been no opportunity to use them, for guns could not approach and unlimber within effective case-shot range of unshaken deployed lines, say 400 yards—but there had seldom been guns enough even for the purpose, and no one to handle them when they were available.

The extreme range of the musket was about 1,100 yards. The fire of a deployed line swept the ground in varying intensity from the muzzles up to that limit, and it took time and much skirmishing to reduce the steadiness of the line to such a degree that all fire control within it ceased. Now, however, after Jena, all countries except England, had abolished the line and fought only in skirmishers and small columns, which had to come out into the open in order to screen the ultimate reserves from observation. Hence the guns obtained a better target with less fire effect to fear, and a bolder use of them became possible.

Thus the latter battles of the Empire took a stereotyped form. The troops immediately in presence engaged in a succession of fluctuating skirmisher attacks along the whole front, by which the endurance of the men was tried to the utmost, and each commander in turn was induced to expend his reserves; the weakest in character, of course, yielding first—and in this phase Napoleon was unsurpassed: to all appeals for help from his most trusted marshals, whose courage at least he never questioned, his reply, if printable at all, took the form of "The battle is not yet ripe." But when at length his instinct told him that the psychological crisis had really come, that his adversary had staked his last reserve, the massed batteries of the Guard reserve dashed forward to case-shot range, tore a hole out of the enemy's line, and through the gap poured the cavalry and infantry ready for employment within the captured position itself.

Provided the ground was favourable, both in going condition and in configuration, only an accident could then avert defeat. It is curious to note in passing that in both the great

crises of Leipzig and Waterloo such accidents did intervene: and that Napoleon did regard the incident at the former as accidental is sufficiently clear from the fact that he did not hesitate to stake his crown on a similar throw at the latter.

It was with these two certain factors of success, from his point of view, that he entered on the Waterloo campaign, and with these before one's mind the whole aspect of the case, as revealed in all subsequent criticism, is seen to be entirely changed.

Within the limits of a single lecture it is impossible to analyse the whole of this criticism, amounting to many hundreds of volumes, in all its details, but the following generalisations will, I trust, prove of service to present-day students, and are necessary to make my position clearer.

The school of military thinkers, whose opinion commanded general respect when Napoleon began his career, were, of course, steeped to the lips in the traditions of the previous century; they were far older than he was, and he felt that to win their approval it was necessary not only to win battles but to *explain how he won them in terms which would appeal to their understanding*. For the most part they were out of touch with the troops he actually employed, and quite unaware of the extraordinary changes the Revolution and the changes in social conditions generally had introduced into the practical conduct of operations. The critics felt that they must justify their previous opinions by illustrations from Napoleon's practice, and Napoleon felt that he had to justify his practice by illustrations from their opinions; and when failure finally shook his position, he was compelled to throw the blame for this failure on the fortune of war — not on departure from established tradition. The memoirs dictated by him at St. Helena were the outcome of this intention, and reveal unmistakably the necessity he felt to place himself in the right with contemporary criticism.

The evidence supplied by the memoirs of his marshals and subordinates are coloured by the same desire, each wished to show that whoever else had sinned he at least had always acted in conformity with established tradition. Indeed, none of them had ever known anything else, as Napoleon had never explained to him the real mechanism of his thoughts, for the reason possibly that the grandest and simplest of his ideas seemed to him such an absolute matter of plain, common-sense that he imagined that all his war-seasoned commanders, except Jerome and Eugene Beauharnais, with whose limitations he was naturally more intimately acquainted, were as alive to their importance as himself. This attitude of mind is of common occurrence with men of great ability, as everyone of us who has ever come under the influence of an exceptional intellect can realise. And, curiously, it is to the accident of the very low opinion he held as to the intellectual deficiencies of his brothers and of his son-in-law that we owe the re-discovery

of the secret of Napoleon's methods, for only in his letters to them does he ever explain in perfectly clear and simple language the real thought at the back of his mind, and it was these letters which first put the modern school of French strategists on the track of the idea.

Napoleon's failure at Waterloo having thus re-established in unquestioned supremacy the venerable dogmas on the conduct of operations current during the eighteenth century—the only way to fix the responsibility for that failure lay in a minute sifting of all the evidence and a particular inquiry into the veracity of the witnesses. The subject therefore became rather a question for the law courts than for scientific study; and the lawyers have very kindly thrown themselves into the breach, providing us in many studies with narratives of extraordinary interest, and a wealth of detail, which enables one to realise the course of the whole campaign almost as if one saw it on a cinematographic screen, but with no greater result as to the explanation of the underlying cause of the whole catastrophe, from a strictly military point of view, than a cinematographic reproduction of any other phenomenon would supply.

Those who have saturated themselves sufficiently with the gradual evolution of Napoleon's methods and can realise how he instinctively "made the best practical use of the means at hand to the attainment of the object in view" (Moltke) can hardly be sufficiently grateful for the accuracy of detail these pictures reveal, but I submit that this very accuracy is a danger to those who take up this campaign as a separate study, and whose previous reading does not permit them to estimate the mistakes revealed in their proper relative proportions. Here I speak from my own experience. Like hundreds of others I was thrown head foremost into the study of the Waterloo campaign with very little detail knowledge of the details of the previous ones, and I recall distinctly how crystal clear the case for the prosecution seemed as I followed it in the briefs presented by Chesney, Charras and others. The delay in the orders to Vandamme on the night of the 15th, D'Erlon's wanderings on the 16th, Napoleon's hesitation and waste of time on the 17th—all fitted into place and led up to the final catastrophe, with its inevitable conclusion, that Napoleon, however great he had been in his former campaigns, in this one at least had hardly attained to mediocrity.

But as I read the history of his previous successes and began to understand the inherent sources of error common to all armies, and to the French in particular, my point of view gradually changed. I found that every mistake discernible in the 1815 campaign was apparent in every other campaign, and often in greater magnitude. Orders had frequently miscarried, corps had wandered unemployed between two battle-fields, and Berthier, as Chief of the Staff, had been guilty of quite as many errors in his functions as Soult, but success had been attained in spite of all these drawbacks. Then it began

to strike me that a certain percentage of error being absolutely unavoidable, it was inconceivable that a great commander could have relied on machinery so delicate in its nature that its success or failure depended on an unattainable precision in the working of all its moving parts. Since even the ordinary engineer, dealing with dead materials, the strength of which he can estimate with almost mathematical accuracy, never dreams of omitting a large factor of safety from his calculations to meet all possible adverse combination of circumstances against him, it seemed inconceivable to suppose less precision in a great commander dealing with such far more uncertain materials as human passions and weaknesses; the difficulty only lay in discovering what it was that differentiated Napoleon's instrument of war from all others which had preceded it, all of which would certainly have been deranged had similar blunders been committed in them.

In previous campaigns victory had usually remained with the commander who made the fewest mistakes. Under Napoleon the proportion of mistakes did not seem to matter, for very generally his subordinates committed more errors than those of his adversaries.

It was only when my attention was drawn, as I have above explained, to the modern French doctrine that I found the solution, and the best way to demonstrate it is to apply the method to the concrete case of Waterloo and show how its extreme simplicity rendered the French army under Napoleon practically "fool-proof," to use a modern and exceedingly expressive piece of slang.

On the night of the 14th June Napoleon's army stood as shown in the diagram, practically in the "lozenge formation," almost precisely as in the Jena campaign, its immediate object being to occupy the Charleroi-Quatre Bras-Sombreffe triangle in such manner that no large body of troops could pass between it and the marshy district formed by the head-waters of the Dyle without certain destruction, and driving before it during the course of the 15th the advance guard of the Prussians, it fulfilled this purpose, though neither wing reached the points actually assigned to it.

The question then arose for Napoleon to decide upon which of his two adversaries to turn, and this was impossible until he knew what Blücher was intending to do.

If Blücher, following the precedents of 1813, decided to retreat it was of no use following him, for then Wellington lay on his flank and rear. In that case he would march direct on Brussels, a move which promised results even if Wellington refused to fight a battle in its defence.

As this, however, would postpone the decision, it was all to Napoleon's interest that Blücher should attack him, or at least form up within striking distance to be attacked; hence one can imagine with what relief the Emperor, on the morning of

the 16th, observed a Prussian corps forming on the hills before him. Its presence argued the approach of more, and since with his perfect fighting machine he felt absolutely certain of victory against anything that Blücher could reasonably put against him, he deliberately waited for the Prussians to form so as to have a sufficient target for his guns to develop their full efficiency. What happened to Ney meanwhile was really immaterial. Nothing that Wellington could concentrate in

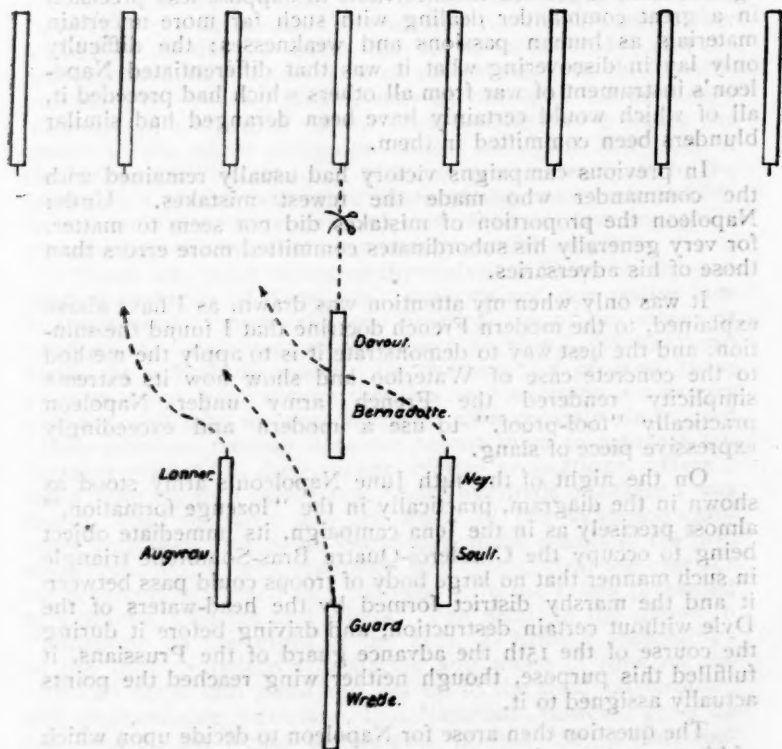


DIAGRAM TO ILLUSTRATE THE NAPOLEONIC SYSTEM.

the day could drive his 30,000 men back for more than a few miles, and the further Wellington penetrated into the Quatre Bras triangle, towards Charleroi, the easier it would be for the *masse de manœuvre* to swing in on his flank next day.

Hence, since you can never be too strong at the decisive point, it seemed a reasonable precaution to send for D'Erlon's corps, though quite naturally Ney, in the heat of action, con-

sidered it superfluous, as indeed the facts have since shown it to have been, for Napoleon easily beat Blücher with his 6th corps, Lobau still in hand, and only the sudden storm, which practically terminated the battle, prevented a pursuit which would have converted Blücher's retreat into a rout. It is quite possible that the intervention of D'Erlon's corps might have placed the Emperor in a very awkward predicament, for as soon as Blücher became aware of its approach threatening his right—an approach which could not have been concealed—he would not have committed his last reserves to the fight, but would have initiated a retreat with his forces still under control, and Napoleon would have found himself with two unbeaten armies, one on either flank.

Napoleon himself was entirely satisfied with the result of the fighting, as his very mild reprimand to Ney sufficiently shows. Ney, indeed, had accomplished all that was required of him by attracting and holding Wellington, though he had suffered very severely in the process. All that now remained for him to do was to take up the rôle of *avantgarde général*, and by attacking Wellington vigorously to constitute the fixed point round which the *masse de manœuvre* could pivot. The more troops he could draw upon himself the better, hence the Emperor was amply justified in the delays of the morning of the 17th, for the troops needed time to recover from the disorganisation of the previous day's fighting—a point civilian critics generally ignore.

But as the hours went by, and no sound of guns arose to show that Ney, in obedience to the specific orders sent to him, had commenced his attack, the Emperor did become impatient, and his reprimand to Ney when he met him was both sharp and severe. In fact, Ney's disobedience had endangered the whole campaign, immeasurably more so than any previous error or delay, for Wellington, not being "held" by a vigorous attack, had his troops completely in hand and commenced his retreat as soon as he saw Napoleon's approach.

Seeing his prey escaping him, the Emperor initiated a pursuit with all his customary energy, and but for the sudden intervention of a storm of unusual intensity, history might have had a very different tale to unfold—for the heavy rain swamped the fields and confined all movement of troops to the roads. Since it was part of Napoleon's method to march whole Corps in mass of Divisions straight across country, the delays consequent on this downpour can be imagined. Actually, according to Houssaye, the tail of the long column into which the army resolved itself on the Brussels road had not completely closed up when the battle began next morning.

Napoleon himself, with the leading battalions and a couple of batteries, pressed on along the great road until from the hill near the "Belle Alliance" farm he saw the British in position, and the reply to the fire of his guns, which at once unlimbered, showed him for the moment that they were there to

stay. His "Enfin je les tiens ces Anglais," sufficiently shows the working of his mind.

All night long the downpour continued in varying intensity, and the French spent a most miserable night. As an indication of the ideas on horsemastership in their cavalry, Houssaye tells us, that many of the men, having fed their horses, remounted and slept in the saddle.

The Emperor remained in an optimistic frame of mind throughout the night. He knew he had beaten three out of the four Prussian corps on the previous day, and felt convinced that the army, as a whole, could not be fit for united action for three or four days, during which Grouchy had an ample force to observe them, and the defeat of Wellington's heterogeneous force would only be the affair of a few hours at most, once the ground was fit for his guns and cavalry to manœuvre over. But when the British troops fell in and were seen to file off into their positions below the crest of the hill, some doubt at least appears to have crossed his mind as to whether they meant to stand after all. Ney certainly said to him that the British were retreating, and though the St. Helena memoirs assert that the Emperor laughed at the idea, he must have recurred to it immediately afterwards to Soult, or the latter would never have warned him "that he did not know the British." Looking at the matter from his standpoint, and remembering his previous experience, together with his subsequent conduct of the battle, I do not see how he could conceivably have come to any other conclusion, for what had the British to gain by waiting?

From his position, he could only see a few vedettes to his right, signs of occupation in Hougomont and La Haye Sainte and a long row of gun muzzles showing on the skyline, whilst to the east of La Haye Sainte lay the Dutch-Belgians formed in the ordinary Continental manner and presumably only intended as the last echelon of a rear guard.

To brush these aside was a very small affair indeed, for which a couple of corps would amply suffice, and he would still have Lobau's corps and the Guard available to deal with such remnants of the Prussians as Blücher might have rallied and Grouchy could not hold. Hence the appearance of a body of Prussians near St. Lambert about 10 a.m. gave him no concern, and at 11 a.m. he gave the signal to attack.

I have no space to follow the battle in detail. I can only point out that up to the last moment, say about 7 p.m., nothing occurred to shake this conviction of retreat, but much to confirm it, and that the Prussians as spectators on the flank summed up the situation almost precisely as he did. For, seeing the French attacks develop about noon, Blücher halted his troops on the Larne, and with Gneisenau continued to watch the battle in a state of irresolution, convinced that the British must be overrun and aware that he himself could not concentrate men enough in time to

meet the blow of the French reserves, once they were set free to act.¹ If at 4 p.m. Ney's great cavalry attack had gone over the British, it is clear from the map that Blücher would have been in a position of extreme danger, for the delays due to the fire in Wavre and to various staff blunders made it impossible to deploy his three available corps for battle before nightfall, and meanwhile Napoleon, with 50,000 fresh troops in hand, could have fallen upon and destroyed Bülow's corps before help could arrive.

Even two hours later the same thought struck Ziethen, who hearing from his scouts that the British were in full retreat, halted his command and refused to obey the urgent summons which came to him from the British right until Müffling's message to the effect that we still held our ground removed the doubt from his mind.

The hesitation of Blücher and Gneisenau, described by Grolman and referred to above, proves to have been sufficiently justified by the actual facts of the case as we now know them.

At this very moment (about 3.30) Napoleon had given Ney orders to attack the centre of the British position with such troops of D'Erlon's Corps as had been rallied, and Milhaud's Cuirassiers, whilst the great mass of artillery in the French centre was pouring in its heaviest fire across the valley over the heads of the advancing French. By common consent this appears to have been the most critical moment of the battle for us, and the French eye-witnesses state that several of our battalions, till then visible behind our guns, were withdrawn a few hundred yards to shelter them from the heavy cannonade. Houssaye states that Ney, seeing this withdrawal, interpreted it as a commencement of a retreat, and he also states that Ney could see fugitives, of which admittedly there were a considerable number, streaming along the great road back to Brussels; but be this as it may, the conviction formed itself in his mind that we were retreating, and that with a few squadrons of cavalry he could capture the line of our guns which still held the ridge, and on that point of vantage bring up a sufficient mass of guns to prepare the way for the final "knock-out blow"—the characteristic of the Napoleonic battles. He rode across to Milhaud's Cuirassiers and ordered them to attack, which Milhaud at first refused to do, and a stormy scene ensued, Milhaud only consenting when assured that the Emperor had given Ney authority to demand the attempt. The Cuirassiers then moved off, and the remainder of the mass of cavalry at hand, seeing their comrades advance, conformed to the movement. The Cuirassiers crossed the intervening valley, suffering heavily from our artillery fire, but rode through the guns, and only then

¹ See "Leben und Wirken des Generals Carl von Grolman," by General E. von Conrady, Vol. II., p. 309. For translation, see Maude's "Evolution of Modern Strategy," p. 94.

discovered the squares immediately behind them. There was no time for an organised charge, and every squadron leader chose his own target and endeavoured to make the best of the situation. As each successive line of horsemen reached the crest the same scene was repeated, until the confusion reached such a height that for the better part of two hours all superior leading became impossible, and in the meantime Bülow's Corps, galvanised into action by Grolman's impetuous command, got home compelling the Emperor to expend his available reserve, all except four battalions of the Old Guard. On the future course of the action I have not time, nor is it necessary to dwell; all that it is necessary to retain is the point that it was the misunderstanding between Ney and his cavalry commanders which, by setting uncontrollable masses of cavalry in motion, rendered Napoleon's ideal of attack incapable of realisation. Milhaud's Cuirassiers reached the ridge, silenced our batteries, and disappeared down the slope behind them, thus giving the opportunity for the great battery to limber up, gallop across the valley, and unlimber again at decisive case-shot range of our squares. Had that battery once been formed, the existence of those squares would have been a matter of minutes only, and the four battalions of the Old Guard, to say nothing of those of the Young Guard, still available at 5 p.m., would more than have sufficed to pierce our very shaken centre. In that case Müffling would not have been able to pledge his word to Ziethen that our troops were not in full flight, and the consequence would most probably have been that we at any rate would have been badly beaten.

Of Grouchy, time only permits me to say that according to my reading of the Emperor's mind, Napoleon never expected him to do more than hold his own weight of Prussians, and whether he did that at Wavre or at any other place out of actual sight of the battle-field was a matter of indifference.

In the few minutes still left to me I can only briefly indicate the final conclusions to which I have been led by the study of this new French Doctrine. As opposed to the "linear" conception of the Germans in 1870, the Napoleonic method guarantees absolutely the numerical superiority at the decisive point, provided only that the *avantgarde général* can, by the vigour of its attack, or ultimately by the obstinacy of its resistance, gain the time required for the execution of the necessary marching by the *masse de manœuvre*.

Where both sides adopt the Napoleonic form, then again the gain of time becomes the decisive element, and the amount of time required may be reduced by superior mobility; and in either case, the only way by which the calculations of the adversary can be destroyed is by the employment of unusual tactical methods, which, either by the increased duration of the resistance they afford, or by more vigorous use of offensive power, destroy the time calculations on which the adversary has based his manœuvre.

Wellington's unexpected tactics—unexpected, that is to say, by Napoleon,—is a case illustrating the former method, and had we been in a position to attack and destroy Ney's force at Quatre Bras in the same time that Frederick the Great defeated Soubise at Roszbach — *i.e.*, in about an hour — the Emperor's calculations on which he founded the battle of Ligny would have been equally thoroughly upset.

But either form requires a far higher degree of self-sacrifice on the part of the troops making use of it, and self-sacrifice is the consequence of higher discipline, which we, with our seven years' term of service and higher average of fighting spirit—the chief characteristic of the race—ought to be able to secure.

But to do this we shall have to reverse completely the tactical tendencies of the past thirty years, and instead of teaching the soldier that his highest duty is to live to fight another day, we shall have to go back to the old spirit of the British Line, and teach him—to quote the words of Scharnhorst—"to know how to die, not how to avoid dying."

Mr. F. L. PETRE:—I am sure we have all listened with the greatest interest to Colonel Maude's excellent exposition of the development of Napoleon's ideas as explained by the modern French school of strategists; but I would suggest that Waterloo was the campaign which should have been selected, not as an illustration of the development of Napoleon's methods, either strategical or tactical, but as an example of the failure of the prophet to act in the spirit of his own faith. The great exponent of the modern French school, I take it, is General Bonnal, who has written three works, entitled "*La Manœuvre de Jena*," "*La Manœuvre de Landshut*," and "*La Manœuvre de Wilna*." The first two I have read and studied, but I have not yet read the third. The first represents Napoleon's methods at their zenith, and it also represents their author at his zenith in their execution. That is shown throughout the book, and it is stated specifically by General Bonnal. After Jena, or at any rate Friedland, I would venture to suggest that neither Napoleon's strategy nor his tactics developed to any great extent. In strategy, I think, there was no development. In his tactics there was a development in his employment of great batteries, either to fill a gap in his own line or to breach the line of the enemy, as he did at Wagram in front of Macdonald's column; but that had already begun at Jena and Friedland. In his infantry tactics there was certainly no development, but a retrogression, which was forced on him by the failing quality of his infantry. That is best exemplified by Macdonald's column at Wagram, when twenty-two battalions were sent forward on a front of one battalion, losing an immense amount of fire, and suffering appalling losses; and that was done because Napoleon could not trust his own troops. He had had to do the same thing when he tried to break the Austrian centre at Essling, and had to do it again later for the same reason. I venture to suggest that the failure in quality of his infantry had a great deal to do with the increase of his artillery, and the massing of it. In 1809 he said: "The more inferior the quality of a body of troops the more artillery it requires. There are some army corps with which I should require only one-third of the artillery which I need for others." That shows on what line his thoughts were running, and the same thing is indicated by his adoption of the system of regimental guns after Essling. The fact was that he was very

much outnumbered by the Austrian artillery at Essling, and in the interval of six or seven weeks before Wagram he had to make up the deficiency. He said that it did not matter at all whether the guns with the regiments were three-pounders, four-pounders, or six-pounders, and that points to the fact that he looked to them more for moral support than for actual damage. Now, if you study Bonnal's "*Manœuvre de Landshut*" you will find how far Napoleon had already gone in his decline in the practice of his own professions, even in 1809. His genius, as Count Yorck von Wartenburg says, still flared up at intervals with greater brilliancy than ever; but, as General Bonnal says, a long course of victory had so puffed him up with pride as to make him at times false to his own principles. That is the key to the general's book on the campaign. He puts down practically everything to Napoleon's pride, which led him into many mistakes. His strategical deployment, as far as he was personally concerned, was as perfect as before Jena. Berthier had failed him terribly by widely dispersing the army, and Napoleon, with infinite skill, succeeded in uniting them into a hollow square, into which the Austrians would not dare to penetrate. But, no sooner had he got his "battalion square," than he proceeded to break it up. Instead of keeping it together he sent Massena round by Landshut to operate on the Austrian communications. That shows how he was falling off. He was what Bonnal calls "hunting two hares at once," losing sight of the absolute necessity of the only possible method of decision in war—victorious battle. He was endeavouring to operate against the Archduke Charles' communications, to force him to retreat by the right bank of the Danube; in fact, to "*manœuvre*" him out of his position. That was where the Emperor was beginning to have a hankering after the old doctrines of manœuvring rather than of mere fighting. Another idea with which he was obsessed was that of a geographical point, a thing which to the victor of Jena was hateful. He did not march on Berlin because he wanted to get there before he fought a battle. He said himself he wanted a battle, and *after* the battle he would be in Berlin before the enemy. Battle was his great desire, and for battle he turned aside from the Berlin road. In the next campaign (1809) he would not turn aside from that of Vienna. He left the Archduke Charles on the other side of the Danube to collect his army, instead of following him into Bohemia and destroying him, so that the 90,000 men Charles had two days after Ratisbon had grown to 160,000 at Essling and Wagram. That was the second point in which he was deteriorating—his occasional searching after a geographical point rather than after the enemy's army. I have some hesitation in suggesting it, but the constant reference to an advance on Brussels before Waterloo seems to smack a little of the same idea. The third thing in which he was deteriorating, which will come in presently with regard to Waterloo, was his optimism, his pride, and also his unbridled imagination, which allowed him to assume things to be what he wished them to be. The wish became father to the thought. Two days before Eckmühl, Davout had carefully told him that nearly the whole Austrian army was before him (Davout). Napoleon wished the Archduke Charles to retreat by the right bank of the Danube, and therefore he believed he was doing so. It seems to me that on the evening of Ligny he believed that Blücher was retiring on Namur and Liege, and that that was the probable cause why he did not order the pursuit at once. The storm had ceased by sunset, but the night was very dark, and it was practically impossible to pursue at once, especially as the Prussians did not retreat at once. But that was no reason why the pursuit should not have been commenced

at daybreak on the 17th. His pride again led him to despise his enemy—a fatal mistake. On several occasions he wrote of the Austrians to his own commanders as “canaille,” and that is probably worth consideration in reference to Waterloo. He despised Blücher, and would not believe that he was capable of bold action. I do not pretend to know the Waterloo campaign very thoroughly, and I should be very glad to hear the opinions of those who know it much better than I do on what Colonel Maude has said, especially on the question of Napoleon’s alleged belief that the English were retreating, and also in reference to the pursuit of them. As I have said, a good deal was due to Napoleon’s contempt for his enemy.

Captain A. F. BECKE, late R.F.A. :—I have had great pleasure in listening to this most instructive and interesting lecture, but I think myself that the campaign of 1815 should far more be used to illustrate the decadence of the great Emperor’s strategy and tactics rather than their development. Colonel Maude has said that the right flank guard at Philippeville, the 4th Corps (Gérard) was lacking in strength, because the 5th Corps (Rapp) was not ready; but the 5th Corps was surely ready, for it was 20,000 strong, and was in Alsace. What was its object? Surely to hold up, or to get in touch with, the advance of the Austrians and Russians as they surged up against France’s eastern flank. But 20,000 men could not stop 300,000; it was impossible. Therefore, surely Rapp might very well have been reduced to 5,000, and the other 15,000 added to the Grand Army for the great stroke in Belgium. So, with all the other corps stationed in subsidiary theatres. The Emperor in his previous campaigns had shown that he recognised most fully the true measure of his offensive means, and no one so wisely distributed his soldiers on the theatre of war; but here we find 124,500 men launched as an offensive mass on Belgium, while 56,500 are locked up in secondary operations in subsidiary theatres of war. If you will go through those corps of observation carefully, in the same way as I have sketched for Rapp, you will find they can be reduced by no less than 35,000 men, and adding this force to the numbers the Emperor took into Belgium, it would have totalled his army up to 160,000. What would have been the result if the Emperor had had 35,000 more men under his own hand on the 16th June at Ligny? Blücher would still have fought, but Blücher’s right wing would have been destroyed, the corps of Zieten and Pirch cut to pieces, and Blücher and Gneisenau captured. Waterloo would have hardly resulted then, and it would have been only a matter of days before Wellington was driven into the sea. I think the Emperor here was not true to his own great principles. One more point: Colonel Maude said there was a necessity for rest after the battle of Ligny. Is it not a fact that the squadrons of Pajol and Exelmans had fought till dark on the 16th and yet were on the road next morning by sunrise? And what were the 30,000 men of the 6th Corps and the Guard, who had not fired many shots on the 16th June, doing? Were not their cartridge belts and ammunition boxes still well furnished? Was there anything to stop them from being hurled, at 7 a.m. on the 17th June, at Wellington, and given the chance of catching him *en flagrant délit*? Such a lecture as this is important and valuable, for it makes us go back and refresh our knowledge, such as it is, at the Napoleonic fountain head; and if we only act in that manner it will often save us from very serious error; it will save us from accumulating a vast quantity of wrong information and making wrong deductions, and we shall gradually get into the right path. Above everything else, it seems to me, stands out the great lesson taught by the Emperor in every

one of his great campaigns up to and including 1808, a lesson which can be comprised in four words: "March together; strike together." I am unable to agree with Colonel Maude's conclusion, that Napoleon imagined he had only a rear guard to deal with on the morning of 18th June. The evidence adduced in favour of this somewhat startling assertion by no means suffices to prove it so far as I am concerned. I hold it to be a fairly safe rule to follow that the more unlikely anything is the more cogent must be the proof adduced to support it; and the proof given in this case by Colonel Maude seems slender enough, and, I would respectfully submit, quite insufficient for the purpose. Let us briefly glance at the facts. During the night of 17th-18th June, between 1 a.m. and 2 a.m., the Emperor and General Bertrand made the round of the French outposts; no signs of a night withdrawal or an early morning retirement on Brussels were visible within Wellington's lines. Yet had such been Wellington's intention, his men must have been by now astir. Again, later on towards 9 a.m. (at which hour the battle ought to have begun) Ney arrived at Le Caillou, and at once informed the Emperor that Wellington was decamping and would slip out of his hands. Napoleon's answer rang out sharp and immediate: "You are wrong, and it is too late now. Wellington would expose himself to certain loss. He has thrown the dice and they are in our favour." There is no sign here that the Emperor contemplated engaging merely a rear guard. And if he had thought that he had only to deal with a rear guard, why did he make that elaborate parade of the Grand Army's strength? Why did he waste two and a half long hours before launching an attack? Such conduct, as he knew full well, could not entangle a rear guard, and would probably (leaving the Prussians out of the question as the Emperor did) have resulted in a mere repetition of that fruitless stern chase that took place on the 17th June, when, all too late, the Emperor reached the front of Wellington's position at Mt. S. Jean, and being without Joshua's power to stop the sun, had perforce to postpone the battle until the morrow, for his army was strung out in the chase and night was at hand. Again, if there was a rear guard only in front of him why wait for the ground to dry? A battery of 80 pieces is not required to overwhelm a rear guard. Neither in his report of the battle nor in his "Commentaires" does he thus seek to explain his defeat. Of a truth, his attitude and frame of mind are easily understood. He never dreamt of Blücher's intervention at Mt. S. Jean on the 18th June. The luckless Grouchy was supposed to be enough to deal with and neutralise the indomitable Prussian Marshal. And thus there was no need to hurry on the commencement of the attack. The live-long summer day was in front of the Emperor in which to square up matters with Wellington, and for this task Napoleon considered a few short hours would suffice. He therefore could safely take his own time in commencing; Wellington dare not now decamp, and it would be convenient to allow to the powerful French artillery facility of manœuvre. This is no longer the Napoleon of Austerlitz or Jena; in his place we see an over-sanguine man, in whom hope and imagination go ever hand-in-hand; further, he is filled with dangerous, preconceived ideas. He is careless of what happens, and scornful of his foes. Thus he sealed his doom, and the avenging lightning overtook him and struck him down.

Lieut.-Colonel A. POLLOCK (late Somersetshire L.I.):—As other speakers have already alluded to the academic question of whether Napoleon in 1815 displayed a development of strategical science and tactical art, I do not think it is necessary for me to say very much about

it, unless perhaps to venture the opinion that as regards strategy, Napoleon's proceedings in 1815 were normal; that is to say, they were Napoleonic—in other words, they were in accordance with the dictates of common-sense, which appear to be fundamental in the art of war. As regards tactics, on the other hand, it appears to me he had distinctly deteriorated. Colonel Maude has given us two fresh excuses this evening for Napoleon which I confess I had not previously heard of. One is that he mistook the British position for a rear guard. I have heard that hinted before, but never definitely stated. Assuming that was his idea, how much more extraordinary is it that he made no attempts to turn the flanks of the supposed rear guard. There were attempts made on the British centre and on the left and on the right; but to turn the position, as I understand the thing, no attempt whatever was made. That leads me to a point which occurred to me last night when I turned to the list of the lectures in order to remind myself of the title of that which we have listened to this afternoon. Unfortunately I had not time to read up the facts, and therefore I am now speaking purely from memory. I want to put to you an idea that is, I think, perhaps a new one with reference to the battle of Waterloo. Let us suppose that Napoleon, realising that the Prussians were coming on—as you know that they were coming—by dribblets, had determined merely to amuse Wellington for the time, had stopped short before the attack by D'Erlon, or at all events before the attacks by the cavalry and by the Imperial Guard. The Prussians, as you know, attacked Planchenoit three times, and on the third occasion they captured and held it permanently. They were turned out twice. The Prussians had been beaten at Ligny two days before, and for many years they had been accustomed to be beaten by the French. Supposing that Napoleon instead of continuing to go hammer and tongs at the British in a purely frontal attack had amused them, and had meanwhile concentrated on his right wing the available infantry, and cavalry, and perhaps the Guard as well; supposing that instead of standing merely on the defensive at Planchenoit, Napoleon had thrown his strength against the Prussians and followed up their retreat after their first or second repulse, I venture to suggest that they would have run from him as they had done so many times before. They had not run at Ligny, they had merely retreated, and they had fought magnificently; but the fact remains that they were handsomely beaten, and but for the wanderings of D'Erlon they would have been beaten probably so as not to be seen again for a month. If the Prussians had been briskly followed up when driven out of Planchenoit, I conceive that it would soon have been possible for the French cavalry alone to keep them on the move, and then the bulk of the force which had thrust them back could have brought up its right shoulder against Wellington's left. Thus I venture to think that Napoleon might very likely have won the battle of Waterloo.

Captain CHARLES SLACK:—To my mind this campaign exemplifies as many other campaigns have done that you may make the most careful calculations to win success, and then something comes along which renders them abortive. Napoleon's dispositions were perfect up to the 16th June; his exact advance was unknown to the Allies, and they were taken by surprise. Napoleon always said at St. Helena that the 17th and 18th June were days of mistakes, when everything seemed to go wrong. But the only thing that could have brought success to Napoleon was the rout and dispersion of the Prussians at Ligny. He only defeated

them, and Grouchy did not follow them up so as to prevent them joining the British. At the same time, many factors come into the question. I do not think sufficient importance is given to the tired state of the French troops. They had been fighting and marching all through the 16th and 17th of June, and there was every reason for the French to believe that the Prussians had been dispersed and were unable to form up again, and accordingly no supreme exertions were recognised by the French as being necessary to follow up their success at Ligny, and hence the misfortunes that followed.

Captain C. BATTINE (late 15th Hussars):—Attention has been drawn this afternoon to the interesting books recently written by General Bonnal, who was Chief of the French Staff College for some time, and who has resuscitated to a great extent the study of the Napoleonic Wars and the methods of the Emperor in the leadership of his army. It would almost seem that the revival of interest in France in the Napoleonic methods was started in Germany. The mention of General Bonnal recalls another very interesting book written by a German officer who lost his life in China, Count Yorck, who dealt with Napoleon as a general, and who sketched the rise of his career to the point where it reached its zenith, and the subsequent years of disaster. He argued that Napoleonic methods distinctly deteriorated after Friedland. If we take Waterloo as an example of Napoleonic methods, I think we must agree with the last speakers that Waterloo is not a masterpiece either of strategy or of tactics. The concentration was very brilliant, but it was extremely hazardous; perhaps it was the boldest of all Napoleon's strokes, concentrating, as he did, in the very centre of the allied army. The only possible chance of success lay in most accurate and successful execution of the plan, extremely good tactics, and extremely good staff work. I think that the French commander should have estimated from the very beginning of the campaign that an army enrolled so quickly as the army which marched into Belgium in 1815 was hardly capable of fine tactical strokes at first, and very unlikely to have the extremely good staff work which was absolutely essential to such delicate work as Napoleon demanded of his army on the days of the 16th, 17th, and 18th of June. To show that that is not hypercriticism, we have only to compare the work of Napoleon's staff, Napoleon's cavalry, and Napoleon's subordinate leaders, with Wellington's. There is not time now to sketch it in detail, but you will see in half a dozen important points how far better the British army was led in 1815 than the French, and how much better the British cavalry did its work than the French, and, what is very important, how very much better the British cavalry was mounted than the French cavalry. Admitting that Napoleon's scheme of smashing the British army depended on breaking their centre and deluging the field with cavalry, the French cavalry were not mounted well enough to execute the plan, and they utterly failed to do it. I think that that ought to have been apparent to the French command before ever they left Paris. I will just quote one other instance where the execution of the French plans fell far short of their designing. We may take the utter failure to link up the different contending bodies by cavalry detachments. Wellington was in constant touch with the Prussians, in spite of the somewhat unexpected marching of Blücher's army after Ligny, who was in touch with a detachment on his right. On the 18th June the 15th Hussars kept up communication throughout the day with the British detachment on the right at Hal. On the other hand, Ney's most important action at Quatre Bras was not

reported to Napoleon that evening at all. I think it was eight o'clock in the morning before Napoleon heard that Ney had failed to shift Wellington's troops from their post at Quatre Bras. Considering that the whole scheme of campaign depended on dealing in succession with Wellington and Blücher, it was of the very greatest importance that non-success or failure should be promptly and accurately reported, in order that the mass of the French troops might be directed as circumstances demanded either against Blücher or against the British. Then of course there is the question of the retreat of the Prussians. There can be no possible excuse for the way the French cavalry and staff lost sight and touch of the retreating Prussians. To get up in this hall to criticise Napoleon seems to be impertinent, but if we are to learn from the campaigns of the past we must use our wits and study the failures of great masters as well as their successes, and the more we study them the more we see that every great general does make mistakes, and that every army, however perfect, does break down in certain points. Therefore there is every reason for us to take heart of grace and know that we can beat any other army, however good, if we only take the necessary trouble.

Colonel F. N. MAUDE, in reply, said:—At this very late hour I can hardly go in any detail into all the questions raised. With regard to the choice of the title, I admit perhaps it is not a proper title. But the subject of the examinations for promotion coming off in March is the "Campaign of Waterloo," and I thought it might possibly interest a few and perhaps attract a better audience. However, it may not have been quite fair to give that title. With regard to Mr. Petre's criticisms about Macdonald's column and the use of artillery, the art of tactics is very different from the methods of tactics. I claim that Napoleon was an artist in war, and handled the troops like an artist. Even when he had such unreliable material as in 1809, he understood how to make that material fight. It is not a question of saving their lives or keeping them out of the hospital. The thing is, when you have men, to make them fight; and that, I believe, is the highest form of the Military Art. To devise methods by which you can skirmish about the country and lose nothing may be tactics, but it is not Art. The same remarks apply to a whole number of questions which have been raised, many of which I did not try to go into merely for want of time and space. I went to the bottom of the whole thing, and I think the best way to put my point is to remind you again of Moltke's definition of the Art of War: "The Art of the leader consists in making the best practical use of the means at hand for the attainment of the object in view." Napoleon started over the Belgian frontier with an army gathered together anyhow, with a staff half of whom were rather doubtful and none of whom were exactly educated or trained, and the Art was to get such an army along at all. I have pointed out that he did get that 200,000 men—a very large number—into that triangle, and nothing else mattered except that the Prussians should attack him as they did. Then the whole machinery worked itself. Of the little errors, one cancelled the other. We made errors and so did the French. The net result was that the great artist in war did what no other man could have done, put that body of men into such a position that practically speaking he was bound to win unless he met with a condition that it was reasonably impossible for him to have foreseen, namely, the peculiar tactics of the British troops. It appeared to all the French generals and marshals who had not been in the Peninsula that victory was a certainty for them; but the men who had been

in the Peninsula warned Napoleon to look out. When the fighting began they remarked that it was too much like a battle in Spain. The concentration of strategy was splendid, and Napoleon's tactics must have worked on the assumption I have given. Napoleon could not see through a hill any better than Wellington. Wellington, as he told us, spent half his life in trying to see what was on the other side of a hill. All Napoleon could see was what I defined in my lecture. There was no way of using the raw material he had excepting the way he did. He did not think of turning flanks. Had he had the advantage of our South African experience, no doubt he would not have wasted precious time; but if we had had him in command during those dark days, perhaps our experience might have been different also.

The CHAIRMAN (Lieut.-General H. D. Hutchinson):—It is my duty as Chairman to close these proceedings by offering a few remarks on the lecture to which we have listened, and on the discussion which followed it. Colonel Maude is well known to most of you as an omnivorous reader, as a prolific writer, and an earnest student of Military History and Military Art, and whenever he is so good as to give a lecture in this Hall he is pretty sure to arouse our interest and to be listened to with attention, though we may not always agree with all that he says. On this occasion, if I understand him correctly, he explains to us that the secret of Napoleon's uniform success in the great struggles in which he engaged was that he manoeuvred his armies in such a way that when a portion of his force, generally his advanced guard, struck the enemy it pinned it, so to speak, to the ground until his main body—his *masse de manœuvre*, as Colonel Maude calls it—could come up and smite it and complete its destruction. Well, when Colonel Maude propounds propositions of such interest to his audience, I am sure no one is more glad than himself that they should be examined and criticised from every point of view, and he will therefore permit me to say that there are three points which occur to me as deserving very full inquiry and consideration before his dictum can be accepted. In the first place, is it the fact that it was a fixed principle of the Emperor to manoeuvre his forces in the manner described by the lecturer? It would require much more research than I have had time for (for I only received the full lecture yesterday) to verify this statement. There can be no question that Napoleon was a genius in the way in which he handled his reserves, knowing with an astonishing firmness when to refuse to allow them to be used; and on the other hand, appreciating with an unerring instinct when the psychical moment had arrived for hurling them into the conflict and finishing the affair. But I am not prepared at present to go the whole way with Colonel Maude and to say that it was a guiding principle of the Emperor's method of conducting his fighting to consider one portion of his army as a retaining force of which the direct object was to fix and hold the enemy, to paralyse his initiative, his independent will power, and pervert his intentions until his own *masse de manœuvre* should appear upon the scene and be launched like a thunderbolt on the shaken and demoralised foe. This aspect of the proposition requires, I think, much more elucidation and inquiry than it has received yet before its trustworthiness can be accepted. The second point I would refer to is Colonel Maude's statement that Napoleon's method, by which he assembled superior forces at the decisive point at the right moment, has been a secret until within recent years (1896). I presume he means that soldiers and students have until now missed the essential feature of Napoleon's strategy; that they have not appreciated the true method on

which he worked. Well, as I have already said, are we satisfied that this was his method? Was there anything really new to discover? Was there, in fact, a secret to reveal? When we reflect how long and how earnestly the great Emperor's campaigns have been studied by great minds and great masters of the Military Art in every country in Europe, it is a little difficult to acknowledge that the mainspring of his success has been hidden from all eyes until now. This is a point, however, which no doubt will give rise to interesting discussions outside this Hall. Finally, Colonel Maude has spoken of Napoleon's "uniform success." That expression, of course, must not be taken too literally. The Emperor's successes were many and brilliant, but he had his reverses, too, and the subject of the lecture being the method by which he achieved such uniform success, it is permissible to point out that whatever the method was, the result was in several instances great failure. For example, was Napoleon successful at Aspern in 1809, in Russia in 1812, or at Leipzig in 1813, or at Waterloo in 1815? These instances and others would have to be considered, as well as the instances of his success, and in tracing them to their origin it would perhaps be found that the great Emperor had no "sealed-pattern" method, but that he was merely guided by those great principles of strategy which from all time have been the weapons of all the great masters of the Art of War, and in the application of which it may be said that he was hardly approached by any commander before or after his time, and has been surpassed by none. I am afraid I have trespassed too long upon your time. I think it is one attribute of a good lecture that it should not only interest in itself, but also provide ample food for reflection and for comment and criticism. Judged by this standard, Colonel Maude has given us a most interesting afternoon, and I am sure you will cordially support me when I tender him our very best thanks for the time and trouble he has devoted to this subject in our interests.

This lecture was delivered at a Staff Conference at Canterbury, and is republished with the permission of the War Office. The Zaidin Khat and Mohand expeditions have illustrated the advantages of an organized transport system such as was created in 1900-1901 in India. From the reports received the transport did admirable work.

SUPPLY AND TRANSPORT IN INDIA.¹

By *Lieut.-General Sir E. H. H. COLLEN, G.C.I.E., C.B.*

THE General Staff are well aware of the deep importance of the subject upon which I have been invited to address you, and of the need for a sound system of Supply and Transport in that part of the Empire where the British and Indian Armies are united in its defence and in maintaining the power of Britain in the East.

To understand the Indian system, we must see how it was evolved, and in order to do that we must deal first with the question of supply, and then with that of transport.

I.—SUPPLY.

I think there is no doubt that the formation of the Commissariat Department about a hundred years ago, was on a French model. It was to be an Intendance to supply everything required by an army, including horses and warlike stores. Before that time, contractors were mainly employed. The Commissary General controlled the whole expenditure at first, but he was relieved of the accounts in 1821, and these were submitted direct to the Military Board, which, I may remind you, was abolished by Lord Dalhousie in 1854. Gradually, as the army increased, and its requirements enlarged, the scope of the Commissariat Department was restricted to supply and the provision of transport. In 1843 the Military Board took a greater share of the work, and the Commissary General became a member of that body. The first Afghan War of 1839 to 1843 had just closed, and the prophecy of the Duke of Wellington, that the whole thing was one of Commissariat—and that of Commissariat one of means of transport—had been fulfilled to the letter. The commissariat system was good enough in India in its linking with the civil population, its power of procuring and using supplies, in its business ways, and in its capacity for getting "carriage"—as transport was then called in a country with resources; but it failed in a barren land, when the transport failed. The Gwalior, the Sutlej, and the Punjab campaigns followed within a short period. Shortcomings came to light, and a Commission of 1852 reported a variety of systems in the three presidencies, recommended a uniformity of system, the complete separation of the Commissary General from the Mili-

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tary Board, and the entire control being given to this officer. Some of their recommendations were adopted, but not all. And when the fire of mutiny in 1857 burnt up the land, while we found ourselves at first in desperate straits for transport, there was no real difficulty in supplies, and I remember when I was at the Staff College, in 1872, that at a lecture I gave at the United Service Institution, the late Lord Sandhurst bore eloquent testimony to the efficiency of the Commissariat in India, saying that whether in Lord Gough's or Lord Clyde's campaigns, a soldier never wanted his rations, or a horse died from want of food.

Small expeditions were no real test of the efficiency of the Commissariat for a large campaign beyond India, and the Second Afghan War of 1878-9-80 found us with three separate Commissariat Departments, owing to the existence of three separate presidential armies, Bengal, Madras, and Bombay. There was no lack of supplies in India. The difficulty was to carry them, but the commissariat officers, for the most part excellent, were too few, and vast efforts had to be made to overcome the defects. In the second phase of the war, General Sir Michael Kennedy was appointed Controller General of supply and transport, and I was for some time Assistant-Controller-General. By a consolidation of control, we neutralised to some extent the evil effects of separation, and employed the whole resources of India for the supply of the army and its hosts of non-combatants. Supply and equipment depôts were established, and military trains for carrying forward stores by road to the bases, as at that time the railway stopped far short of the frontier. I must not stop to go into the detail of this work, but this may be said, that in the barren country of Afghanistan, no soldier, British or native, went without his rations, while equipped transport was sent up in sufficient strength to render the operating forces mobile, enabling Lord Roberts to make his famous march to Kandahar. The Army Organisation Commission of 1879 reviewed, among a great many other things, the organisation and work of the Commissariat Department. The amalgamation of the three departments was recommended, but was not carried out until 1885, under a Commissary-General-in-Chief. By degrees uniformity of system throughout India was obtained. the commissariat officers were more directly associated with the military commands, and the military character of the department developed. It had become a large and unified department, for the purpose of all supplies, stores—other than ordnance stores—or munitions of war. In 1895 the presidential army system was abolished, and India was divided into four territorial Army Commands, each under a Lieut.-General Commanding the Forces, and supplied with a strong army and departmental staff. The Commissary-General-in-Chief was put into direct relations with the Commander-in-Chief, and the Lieut.-Generals Commanding the Forces were practically given control of the working of supply in their commands. One or two of the largest general contracts were still reserved for the Government of India in the

Military Department, but otherwise, the work was to be locally conducted. The clothing factories and department were placed under the Commissary-General-in-Chief for administrative purposes. Various efforts were subsequently made to relieve a heavily-burdened department. Grass farms were established, so that the commissariat should only be called on to supply to British cavalry and artillery when the farms could not supply; dairy farms were instituted for the supply of milk and butter to the hospitals and to the troops; and strenuous endeavours were made to lighten the burden of account work and returns. Considerable increases were made to the *personnel*, 90 officers being added in 1899 and subsequent years, and the title of Commissariat-Transport Department was changed to Supply and Transport Corps.

I may now very briefly describe the existing organisation of the supply branch. Certain administrative changes have been made recently, but these do not affect the duties of the corps.

The duty of the supply branch is to provide the food of British troops, and of British mounted corps under certain conditions, and it also deals with bedding, barrack, and hospital supplies. The Native Army, as you know, has its own system of food supply, but in certain localities the supply branch undertakes this; and on active service, when the native soldier gets free rations, the whole of the supply of the troops in the field devolves on this branch. Besides these duties, it may be called the storekeeping service, as it has in charge great reserves of all kinds, as well as mobilisation stores, clothing, and equipments.

The administration and organisation can easily be understood. The Director-General of Supply and Transport was, until recently, the adviser of the Commander-in-Chief and of the Government of India, and in submitting any proposals to the latter authority, upon which, as in all important questions, the opinion of the Commander-in-Chief was necessary, he had to consult him.

But the Lieut.-General Commanding the Forces controlled the Supply and Transport Corps in the command, and was responsible for its efficient and economical administration, having an Inspector-General of Supply and Transport, to deal with all corps matters, on his administrative staff. In the same way the General Officer Commanding of Districts, now called Divisions, were responsible for the efficiency of the corps, and similarly with the stations or garrisons. The Chief and Executive Supply and Transport officers are officers of the district or station staff, the remaining officers being employed in Supply, Transport, and Accounts duties. In each big command there is a Store-keeper-General at the port, with various duties connected with stores, the equipment of troops for expeditions oversea, the general contracts, etc. The *personnel* of the Supply and Transport Corps consists of:—

1. Officers.
2. Clerical and accounts establishments.
3. Executive establishments.

1. The officers, who must be over three years' service, are appointed from the Indian Army, and occasionally from the British Service, by nomination, but have to pass an examination at the end of a year. There are about 200 in all, besides 21 "Registration Officers," whose duty it is to ascertain, and register, the transport resources of the country. They are seconded in their regiments for five years, and then they revert or enter the corps permanently. Then there are 25 departmental officers with honorary rank for supply duties, 151 warrant officers, and 264 non-commissioned officers, divided between supply and transport. These ranks are recruited from British corps serving in India. After a year of probation, and passing an examination, they are promoted to the rank of sergeant.

2. The clerical and account establishments consist of natives, numbering from between 600 and 700 in the various offices, command and executive, throughout India. There are also 90 to 100 accountants and assistant accountants.

3. The native executive establishments consist of storekeepers, agents, and hospital storekeepers—in all about 300.

In the district or division the Chief Supply and Transport officer is the head of the corps serving in that area, and under him the officers are allotted to supply and account duties. The work may be said to comprise the supply of bedding, clothing for establishments, compensation for dearness of provisions in lieu of rations for native troops and followers, equipments, expenditure and accounts, forage, lighting, and fuel, losses, wastage and exceptional charges, training of men in supply, bakery and butchery duties, supply matters connected with mobilisation, payment of railway charges for troops and stores, rations, and cooking, rum and malt liquor, stores and supplies. In the field the officers of the corps are appointed to divisions and brigades, and perform their duties under the G.O.C., and are responsible to him for the supply arrangements and the maintenance of reserves. In the collection of supplies they receive great help from the political officers attached to the army in the field, whose aim is to keep in touch with the civil population.

The power of administrative, supply and executive officers, and of general and other officers, is a very important matter; but I fear that time will hardly admit of my going into it closely. The administrative officer, i.e., the Inspector-General of Supply and Transport of a Command,¹ acting under the lieutenant-general's orders, has power of sanctioning contingent expenses, miscellaneous and unforeseen charges, temporary establishments, making up articles for experimental purposes, minor

¹ The large Army Commands having been abolished, and the General Officers Commanding the Northern and Southern Armies having now no administrative work, which is divided between divisional generals and Army Headquarters at Simla, there are no Supply and Transport officers with the Generals Commanding the two Armies.

works, up to a thousand rupees in some cases, while he has very considerable powers in the matter of losses, wastage, and contract. General officers of divisions and districts, and their chief supply officers, have similar though lesser powers.

The question of accounts is an important one in the business of supply. I attacked this matter, specially from the army point of view, with the hope of relieving corps a good deal, and abolished a large number of returns. Some relief has been afforded, and the account business has been much simplified. The accounts of Chief Commissariat Supply officers of districts go to the Examiners or Auditors of Accounts at the main centres of account and audit—Rawal Pindi, Calcutta, Bombay, and Madras. I hope it may be possible to introduce the district or divisional system more completely in this matter.¹

The supply branch, as well as the transport, has recently been divided into two parts, the majority of officers having been placed under the Commander-in-Chief, while the minority remain under an Inspector-General of Contracts and Registration, and under the Government, so that not merely at headquarters but in the commands there are two sets of officers, the one dealing with the executive duties, and the other with mobilisation and various stores and reserves.² To save time, I will reserve my observations on this, and on other general questions, such as the need for a reserve of supply officers and establishments, until I have sketched the history of the transport and the existing system. I think we may accept the conclusion that the officers and their subordinates of the supply branch know their work, and are an efficient body for peace and war. The work of supply or commissariat requires business methods, energy, and, as in every other service auxiliary to the army, sympathy with the troops they supply. But in the field everything depends on the ability to procure or carry supplies, and, therefore, practically everything depends upon the adequacy of the transport in most of the theatres of war in which an Indian army might operate.

II.—TRANSPORT.

Transport has been the difficulty of all armies, even in the old campaigns within India itself, in a country where supplies and some means of carriage might have been thought to be ordinarily procurable. Sir Eyre Coote's operations in 1781 were crippled for want of transport; Lord Cornwallis, the year later, was desperately hampered, for the same reason. Wellington (then Sir Arthur Wellesley) insisted on the necessity for a permanent establishment of bullocks and drivers, and the army

¹ This has since been done.

² The four Territorial Commands have recently been abolished. Supply and transport, contracts and registration at first allotted to the Military Supply Department, have now been transferred to the Commander-in-Chief.

under his command, with what were called the "public cattle," marched from Seringapatam to Poona, 600 miles, at an average rate of 13½ miles per day. In the First Afghan War, the transport was ill-organised, and we only got through with immense losses of animals. When the Mutiny broke out, movements of vital importance were delayed for want of transport. After the Mutiny, a system of "moveable columns" was established at certain stations, and transport or "carriage" was provided for these columns, and at other stations a limited quantity of extra carriage, elephants, camels, and pack bullocks, was maintained. Certain special corps, such as the Punjab Frontier Force, had full transport. Although an excellent transport train had been organised for the Abyssinian Expedition of 1867-68, a couple of mule corps represented the organised transport when the Second Afghan War broke upon us and found us unprepared. I was not in India at the time, but on my return I proposed an organisation for the transport, and that of the line of communications, which was accepted by the Commander-in-Chief and the Government. The transport was to be divided into regimental, brigade, divisional, and general transport. The divisional departmental transport was to provide for the ordnance and engineer field parks, reserve supplies, and additional sick transport, while the general transport was to consist of the camel and cart trains on the line of communication. Reinforcements of transport were sent up, and the army stood ready to march on Kabul, when this phase of the campaign was ended by the Treaty of Gandamak. The Army Organisation Commission assembled immediately after this, and recommended the maintenance in time of peace of:—

- a. Moveable column transport;
- b. Regimental transport;
- c. Reserve transport at depôts.

When the second phase broke out there was little transport or organisation, and a tremendous task fell upon General Sir Michael Kennedy and his assistants, who had to co-ordinate the work of the three separate Commissariat Departments. We had to create the transport afresh, and eventually we purchased 71,000 camels, mules, ponies, and pack bullocks, and had hired about 55,000. Officers of any transport experience were difficult to get; the gear was at first defective or deficient; and as to the drivers, we had to engage almost any men we could get. Beyond the bases we organised the transport on a military basis, and separated from the Commissariat. But the arrangement did not work altogether satisfactorily. As to the lines of communication, we largely employed contractors, besides camel and cart trains, and I have a vivid recollection of the train of 20,000 carts on the Khyber line. I mention these figures to show what the business was for the supply of only one division at Kabul, and the division on the

line of communication. We sent up a stream of reinforcements of transport, equipped at large dépôts in India, the transport in the field was worked up by Colonel (now Sir Robert) Low and other officers, and Lord Roberts was able to make his famous march from Kabul to Kandahar. Immediately after the war we set to work day and night to try and gather into shape the experience of this and other campaigns. We drew up a memorandum, which was a small volume in itself. I cannot go into this now, but I do not think we omitted a single point, whether in administration, organisation, training, equipment, *matériel*, expansion, etc. We divided transport into:—

1. Regimental;
2. Brigade, divisional, or departmental;
3. General.

Full transport was to be allotted to corps on or near the frontier, and a limited amount for training to other corps. We proposed to have transport cadres at selected centres, and permanent staffs, to be expanded by the purchase of animals and the recruitment of men. The transport resources of India were to be completely ascertained, and the illegal pressure, resulting in enormous hardship to the people, was to give way to a legalised system of purchase at good prices. Every detail was worked out, and the cost fully estimated. Our scheme was, unfortunately, considered too elaborate in its organisation, and the Commander-in-Chief of the day thought our establishments were in excess of requirements.¹ I may just say that in a few years the establishment found needful rose up to our figures, and that had our organisation been accepted, a very large sum would have been saved in the mobilisation of 1885 on the occurrence of the Pendjeh incident, when we wanted 77,000 animals, and could only get 48,000 by a long and laborious process, and large sums could also have been saved in the Chitral and frontier campaigns of later years. Although no complete organisation was created, the transport was increased until it reached some 31,000 animals—mules, camels, and bullocks—but the tendency of the chief military authorities, who naturally had the last word, was rather towards allotting the mules to regiments, and the dépôt transport, though organised in a fashion, was inexpansive.

The mobilisation scheme of 1886 did a good deal for us, and at least the methods for obtaining transport were laid down.

The transport consisted of:—

1. Dépôt transport for general army service;
2. Regimental transport.

¹ General Sir Michael Kennedy was selected by Lord Lytton for the post of Controller-General of Supply and Transport. He was an officer of the highest ability and administrative talent; but though his work was officially appreciated in the warmest terms by the Government in India and at home, he never received the slightest reward.

For the first kind there were not officers and subordinates enough, and for the second, only certain corps of the army had full obligatory transport. A Commissary-General for Transport had been appointed, and he was specially charged with the work in peace, and in war with working in conjunction with the Quartermaster-General. He did not interfere in the executive business of the transport, or with the local control. The method in preparing for an expedition or campaign was as follows:—A list was kept in the chief district offices of the transport resources, and the district staff officers had lists of officers for purchasing or mobilisation. On receipt of orders from the Adjutant-General, these officers went out into the districts, with small establishments at the collecting centres, and purchased the animals the civil authorities brought in. Drivers were engaged at equipping stations and in the districts, and native cavalry soldiers took charge of batches of animals to the equipping stations, where they were organised and equipped.

In 1895 the first trial came in the rapid mobilisation of a force for the relief of Chitral. The Government transport took the field in excellent condition, and did very well. But here our resources ended; there were no cadres remaining to be filled up, and some 20,000 pack animals had to be got somehow. Great hardship had been caused to the people, and a committee was assembled under Mr. Thorburn, an experienced commissioner in the Punjab. They furnished a valuable report, and established the case for legislative action, also recommending the formation of reserves, the grant of land on the canals to camel-owners on certain conditions of service, and various points of detail.

The question of the legalisation of impressment was of enormous difficulty and importance, and it is not possible to deal with it completely in a few necessarily brief remarks. In 1880 we had strongly recommended such a measure, but the difficulty of getting the thing taken up seemed almost insuperable. Successive administrations declined to deal with it. Impressment of some sort had always existed. For troops marching through the country the law, of very old date, allowed impressment in various parts of the country. But even this did not run in the Punjab, the great source of supply, though we inherited from the Sikhs the practice of impressment of transport, only we paid fairly, while they did not pay at all. For years the idea was to let things be, and neither the Government nor the military authorities would move in the matter, and though my predecessor in office, Sir Henry Brackenbury, was keen to carry the thing through, and did his utmost, an Act was only passed in the Punjab in 1902, to provide for the periodical enumeration and registration of animals for transport, for the compulsory acquisition of such animals in time of war, and for the impressment of the same for hire at any time. All transport animals are to be registered, and with the owner's consent they may be branded, and this will

exempt them from seizure for hire. In preparation for war, the transport registration officer can acquire the animals in his district at a valuation previously made, plus any compensation, and can impress unregistered animals, paying 15 per cent. above the market value. The measure which Sir Michael Kennedy and I so strongly urged in 1880 was at last carried, although only in the Punjab. The old illegal plan was the instrument of intolerable hardship and oppression. The new one is at least equitable.

In 1896, I succeeded Sir Henry Brackenbury as Military Member of Council, and as Supply and Transport was part of the business of the military department, I felt that the opportunity might possibly be afforded me of carrying out my long cherished idea of creating a transport organisation. Sir Henry Brackenbury had been able to increase the transport, and his last words were: "More transport." We were desperately short of money, owing to famine and the losses by exchange; but I began to take the matter up again. Then the frontier campaigns of 1897 sprang upon us, and all work of the kind had to be put aside. At that time we had about 19,000 mules, between 5,000 and 6,000 camels, 7,000 bullocks, and 8,000 carts; but much of this was locked up in places from which it could not easily be withdrawn. The Tochi and Malakand forces were well equipped, but when the 14,000 available mules had been absorbed, we were met by the want of officers, the want of cadres resulting in the collection of a large percentage of unfit animals, and the want of establishments and drivers. We had to arrange for one expedition after another in quick succession. For the Tirah Expedition alone the demand rose to 16,200 camels, 45,500 mules, and 12,600 bullocks. I give you these figures to show the amount of transport estimated to be required for a force of 33,000 troops in such a country. In the various fields of operation we had at one time 80,000 animals employed, our peace complement being about 30,000. I shall not trouble you with the conclusions I formed and placed on record. They were, in the main, endorsed by the committee, which, not entirely without opposition, I was instrumental in calling together, with the approval of the Viceroy and Commander-in-Chief in 1898. We got the best men we could, presided over by the late General Sanford, a man of great ability and experience.¹ When the report was received there were some points on which I did not quite agree with the committee, but fearing discussion would cause delay I waived my opinion on these, and the Commander-in-Chief, Sir William Lockhart, and I, working together in complete harmony, and in conference with all the leading officers, prepared a transport

¹ The members of the Committee were Colonel Christopher, Lieut.-Colonels Hutchinson, De Brath, Tulloch, and Gartside-Tipping; Majors Wharry, Hawkes, and Mullaly; and Captain Wickham.

organisation which followed closely the lines of the committee, but was less costly. Even then we could not, at that particular time, obtain the large sum required. Finally, having previously got sanction for a provisional organisation in 1899, after a good deal of anxious work—having, alas! been deprived by death of Sir William Lockhart's support—I carried through the Council, with Lord Curzon's powerful aid, a plan embracing :—

1. Permanent organisation of transport corps and cadres on a military basis;
2. Formation of reserves of drivers;
3. System of registration and registration staff;
4. A large increase in officers and non-commissioned officers, and in drivers, and improvement in status of the latter;
5. The establishment of camel corps on the silladar system.

At the time the new Commander-in-Chief, Sir Power Palmer, had not a seat in Council, but he was entirely with me in the matter. This is the transport system of to-day in India :—

There are 21 mule corps, 18 mule corps cadres, and 2 pony cart train cadres; 8 camel corps, and 4 grantee camel corps.

The total establishment of the transport is :—

30,713 mules and ponies.

10,438 camels.

3,254 bullocks.

7,435 army transport carts.

The organisation of an Army Transport Corps of mules is as follows :—

12 mules and 4 drivers form a section.

4 sections form a half-troop under a Naik.

2 half-troops form a troop under a Kote Dafadar.

4 troops form a sub-division under a British warrant officer.

2 sub-divisions form a corps under a British officer.

The organisation is specially adapted to the attachment of organised units of the corps to regiments, and it is intended that these shall remain with them on field service.

In each corps there are 5 British commissioned, warrant, and non-commissioned officers, a native adjutant, 25 non-commissioned officers, and 71 lance-naiks, 213 drivers, 31 artificers, and 4 veterinary assistants, and 768 mules, besides 14 riding ponies.

Each corps has a dépôt troop.

The cadres are, of course, on a reduced scale; but have the same complement of British officers, etc.

I fear time will not allow me to go into the organisation of silladar camel corps, the grantee camel corps, and of pony cart trains. The mobilised strength of the camel corps is 243 sarwans, and 972 camels.

The whole system depends on an organisation linked with the resources of the country.

The machinery consists of the 21 transport registration officers in six circles, with their centres at Peshawar, Dera Ismail Khan, Quetta, Karachi, Rawal Pindi, Jhelum, Amritsar, Multan, Lahore, Sialkot, Ambala, Jullunder, Lucknow, Bareilly, and Agra. These officers, with the help of the civil authorities, search out and register the transport resources.

Corps and cadres are mainly stationed in the northern part of India, near the recruiting grounds.

The Silladar Camel Corps have been a success. The main principles are, that the Silladars own the camels; that only one-third of the corps need be at headquarters receiving "employed pay" at 9 rupees a month, and the other two-thirds may be away on their trading expeditions, receiving unemployed pay at 3 rupees a month, with the proviso that they must be able to join at 10 days' notice.

The other camel corps are organised on the system of making grants of land adjacent to the great canals of the Punjab, to camel-owners, on the condition that they keep a specified number of registered camels for service. Several thousand have been obtained in this way.¹

III.—AMBULANCE TRANSPORT.

I fear I have not left myself much time to speak of ambulance transport. This consists in India of ambulance tongas, and dhoolies, and dhandies, or lighter litters. The tongas can, of course, only be used where there are roads or tracks for wheels. The dhoolie is the old and comfortable mode of carrying sick and wounded men. We found that the race of bearers was dying out, and we were able to increase their pay and construct an organisation, giving about 6,000 bearers. We placed this under the medical service, and there is now an Army Bearer Corps of 32 companies.²

¹ This brief account of the creation of the present Transport system very faintly indicates the enormous amount of work which had to be got through. In the Military Department, although all gave valuable aid, I was specially indebted to Lieut.-Colonel (now Major-General) De Brath, while the officers of the Supply and Transport Department, General Hobday and Colonels (now Major-Generals) Christopher, Mansfield, and Hawkes rendered the greatest help in the work. General Sir Edmond Elles, who succeeded me as Military Member of Council, developed and completed the organisation. There have been many difficulties to be overcome, but these were surmounted by the patient efforts of Sir Edmond Elles and those who worked with him.

² Now reorganised into 11 companies, one for each of the 9 Divisions, one for Burma, and one for the Aden Brigade.

I will now say a few words on certain important and difficult questions. The *first* is the administration of supply and transport. This is a vexed question. Other countries have settled it by placing the higher functions under the war ministries, the executive work being under the generals commanding. This we endeavoured to do in India, and I do not remember a single instance of the Military Department intervening in this work. It was left in the hands of the Lieut.-General Commanding the Forces, the Commander-in-Chief representing any matter it was desired to consider. But everything was practically in the hands of the generals of the large Territorial Commands and of the districts.

The *second* question, of the union of supply and transport, is also one which has been much debated. We tried the separate systems, both in peace and war, but did not find them answer. The all-important business is to feed the army, and the supply branch is the great employer of transport. After examining all the evidence in other campaigns and countries, we came to the conclusion that there should be administrative union, and the one control, but separation in all the executive work.¹

The *third* question is the regimental versus the corps system of transport. I may say this gave me many anxious moments. My own view is, and always has been, that the true system is to have regimental transport as an integral part of the regiment, transport corps being organised for the whole of the rest of the services of the army. But I could not have both, and I believe that we were right in basing our system on the corps principle for the following reasons:—

1. Regimental transport is the easiest to organise, if you have previously trained the officers and men.
2. If you depend only on a regimental transport system, there is not machinery for the transport of the rest of the wants of an army, and no power of expansion.
3. We wanted to raise the status of our transport, and to put it on a military basis.
4. By having corps to send detachments to regiments we did not subtract from the strength of the fighting line.
5. Only by this means could we organise a system connected with the resources of the country.

It will be understood that the latest change is the placing of all supply and transport business under the Commander-in-Chief, with a Director of Supply and Transport subordinate to the Quartermaster-General. The Director is assisted by officers dealing with supply and transport respectively, while in the divisions, there are chief officers combining the two functions, assisted by separate officers for each class of work.

The difficulties of transport organisation in India are by no means inconsiderable. The resources of India in mules and camels are not unlimited, and require to be fostered. You cannot keep up a perfect transport for the full needs of an army, whether of 4 or 5 or of 8 or 9 divisions. There are two great objects to be provided for: (1) That every corps and brigade may be able to move at the shortest notice for the repression of internal disturbance; (2) That the field army may be able to take the field in orderly succession of divisions. And for work on or beyond the frontier you have to provide an enormous amount of pack transport. For even 4 or 5 divisions, and for their equipments alone we needed 26,551 mules and 21,541 camels, and for the supply of this force, in Afghanistan, for example, we should need 115,000 camels and bullocks. When the local resources were exhausted, say, in three months, we should want 230,000 of these animals for supply purposes. You cannot supply a large army in Afghanistan without a railway. That was the reason I proposed that we should make the road bed for a light 2 ft. 6 in. railway up the Khyber to Lundi Kotal, and down to Lundi Khana, so that with a stock of light railway material and a prepared organisation, we could lay it down and run it on rapidly when the time came. It would be invaluable for supply purposes. We did get a military railway company started, and some material, and now a second company has been formed. But we want ten times that. Before I left India, in 1901, we had framed various measures to become operative, in case of an emergency arising. I must not go into these questions now, and must content myself with saying that we were engaged in trying to organise the resources of the Indian railways in time of peace, for increasing the stock and personnel of the northern railways, and for work beyond the frontier. What we require is a complete military organisation, upon which we can graft the railway resources of India. Enormous efforts would be required, if ever we should need to move an army beyond the frontier, even to provide for the ordinary equipment of an army of 9 divisions, and a still larger organisation and strength for the 6 divisions to be sent from this country. An immense demand would be made for officers, and it is in the direction of the increase of establishments, both at home and in India, in the expansion of the transport, and in the organisation of the power of rapid railway construction, that I think we should move. There is one more point before I conclude. It is a paramount necessity for the Home and Indian supply and transport services to be brought more in unison. A few Army Service Corps officers are doing duty in India, but I should like to see a strenuous effort made to bring the systems into greater harmony, so that Army Service Corps officers might, on emergency occurring, be sent to India with some knowledge of the work there. One thing we must always remember, that a system which is not linked with the resources of the country is bound to fail.

ESTABLISHMENTS.

Personnel and Animals of Organised Units.

A.—MULE CORPS AND CADRES.

Details.	Pack Mule Corps.		Mule Corps for Cavalry Brigade.		Pack Mule Cadre	Mule Cadre for Cavalry Brigade.
	Service Troops.	Depot Troop.	Service Troops	Depot Troop	Str'ngth (Peace)	Peace Str'ngth.
British.						
Officer (Commandant) ...	1	—	1	—	1	1
Warrant Officers ...	2	—	2	—	2	2
Non-Commissioned Officers ...	2	—	2	—	2	2
Native.						
Adjutant ...	1	—	1	—	—	—
Quartermaster dafadar ...	1	—	1	—	1	1
Kot dafadars ...	8	1	9	1	6	7
Veterinary dafadars ...	4	1 ¹	4	1	1	1
Naiks ...	16	2	18	2	4	4
Lance Naiks ...	71	6	91	6	48	88
Dressers ...	(4)	(1)	(4)	(1)	—	—
Drivers ...	218	18	347	18	144	184
Clerks ...	2	1 ¹	2	1 ¹	2	2
Bellows Boys ...	4	1 ¹	4	1 ¹	4	4
Blacksmiths ...	4	1 ¹	4	1 ¹	4	4
Carpenters ...	1	—	4	—	1	4
Hammermen ...	4	1 ¹	4	1 ¹	4	4
Saddlers ...	16	3 ¹	18	2	4	4
Shoeing Smiths ...	2	—	5 ¹	—	1	1
Syces ...	7	1 ¹	9	1 ¹	6	6
Animals and Carts.						
Mules ...	768	72	864	72	192	172
Riding Ponies ...	14	1	15	1	11	12
Carts, A.T. ...	—	—	800	—	—	300

¹ Will be temporarily engaged on mobilisation.² One Saddler out of these three to be temporarily engaged on mobilisation.³ Three in peace, the other two to be engaged on mobilisation.

DISTRIBUTION OF ANIMALS AND VEHICLES BY COMMANDS AND INDEPENDENT DIVISIONS.

Command or Division.	Ponies.			Mules.				Grand Total— Mules and Ponies.	Camels.			Elephants.	Bullocks.		A.T. Carts.		Tonkas.
	Riding.	Draught.	Total.	Pack.	Draught.	Grass.	Total.		Government.	Hired.	Silladar.		Army Transport.	Siege Train.	Mule.	Bullock.	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
Northern Command ¹ ...	445	104	549	13,265	2,414	1,412	16,821	17,370	758	—	8,544	—	192	1,344	1,921	1,339	395
Eastern Command ...	76	104	180	2,208	100	445	2,753	2,933	—	—	—	32	1,272	816	552	1,252	410
Secunderabad Division ...	80	—	80	1,680	—	89	1,769	1,799	—	—	—	—	672	—	200	309	220
Western Command ...	101	—	101	4,056	648	1,246	5,590	6,051	—	68	1,068	—	734	466	900	387	330
Burma Division ...	28	—	28	1,680	—	—	1,680	1,708	—	—	—	20	384	—	400	175	30
Maxim Gun Mules ...	—	—	—	852	—	—	852	852	—	—	—	—	—	—	—	—	—
Total ...	680	208	888	23,741	2,862	3,192	29,885	30,713	758	68	9,612	52	3,254	2,626	3,973	3,462	1,385

¹ The Commands have been abolished, and there are now 2 Armies, the Northern and Southern Army, with divisional organisations in each area.

**B.—PONY CART TRAIN CADRES, SILLADAR AND GRANTEE CAMEL CORPS, S.T. AND A.T. BULLOCKS
AND RESERVE ESTABLISHMENT FOR MULES AND PONIES.**

Details.	Pony Cart Train Cadre.			Silladar Camel Corps.			Grantee Camel Corps.			Half Trp. Siege Train of A.T. Bullocks.	Reserve of Mule and Pony Establishment.
	Peace Strength.	Mobilised Strength.		Peace Strength.	Mobilised Strength.		Peace Establishment.	Mobilised Strength.			
		Service Troops.	Depot Troop.		Service Troops.	Depot Troop.		Service Troops.	Depot Troop.		
<i>British.</i>											
Officer (Commandant) ...	1	1	—	1	1	—	—	1	—	—	—
Warrant Officers ...	2	2	—	—	—	—	—	—	—	—	—
N.C. Officers ...	2	2	—	—	—	—	—	—	—	—	—
<i>Native.</i>											
Risaldars ...	—	—	—	2	2	—	1	2	—	—	—
Ressaidars ...	—	—	—	2	2	—	—	2	—	—	—
Quarterm'ster dafadars ...	1	1	—	1	1	—	1	1	—	—	—
Kot dafadars ...	5	10	1	9	8	1	—	8	1	—	—
Veterinary dafadars ...	1	15	2	2	4	—	1	4	—	—	—
Naiks ...	2	20	2	18	16	2	—	16	2	1	—
Lance Naiks ...	10	124	10	89	81	8	—	81	8	4	—
Drivers or Sarwans ...	50	495	40	267	243	24	—	243	24	22	3500
Dressers ...	—	5	2	—	4	—	—	4	—	—	—
Clerks ...	2	2	2	2	2	—	1	2	—	—	—
Bellows Boys ...	4	6	2	—	—	—	—	—	—	—	35
Blacksmiths ...	4	6	2	—	—	—	—	—	—	—	35
Carpenters ...	4	6	2	—	—	—	—	—	—	—	25
Hammermen ...	4	6	2	—	—	—	—	—	—	—	35
Saddlers or palanmkrs ...	2	20	2	1	2	—	—	8	1	—	350
Palantr makers ...	—	—	—	1	2	—	—	—	—	—	—
Shoeing Smiths ...	2	20	2	—	—	—	—	—	—	—	85
Bhistis ...	—	—	—	3	3	—	—	—	—	—	—
Coolies ...	—	—	—	—	—	—	2	—	2	—	—
Syces ...	6	18	2	7	7	2	—	6	1	—	—
<i>Animals and Carts.</i>											
Bullocks...	—	—	—	—	—	—	—	—	—	48	—
Camels ...	—	—	—	357	972	96	—	972	96	—	—
Draught Ponies ...	104	1,064	100	—	—	—	—	—	—	—	—
Riding Ponies ...	12	85	3	14	13	1	3	13	1	—	—
Carts ...	582	502	80	—	—	—	—	—	—	—	—

¹ For war and peace service, and for annual training, but only two Veterinary Dafadars will accompany units at annual training.

² Will be temporarily engaged on mobilization.

³ Also one Syce (private) or man drawing pony allowance.

⁴ Two are Workshop Carts.

The native establishment and animals for the Hind Camel Corps, which are only raised on mobilization, are located and registered in peace by Transport Registration Officers.

DISTRIBUTION OF UNITS BY STATIONS.

A.—MULE AND PONY UNITS.

Units.	Stations.	Units.	Stations.
1st Mule Corps for use with Cavalry B'de ..	Peshawar.	20th Pack Mule Cadre...	Rawal Pindi.
2nd Mule Corps for use with Cavalry B'de ...	Quetta.	21st " " " " ..	Lahore.
3rd Mule Cadre for use with Cavalry B'de ...	Lahore.	22nd " " " " ..	"
4th Mule Cadre for use with Cavalry B'de ...	"	23rd Mule Cadre and	Ambala.
5th Mule Cadre for use with Cavalry B'de ...	Meerut.	27th Mule Corps	Lucknow.
6th Pack Mule Corps ...	Peshawar.	24th " " " " ..	Mandalay.
7th " " " " ..	Nowshera.	25th Pack Mule Corps...	Cawnpore.
8th " " " " ..	Rawal Pindi.	26th " " " " ..	Hasan Abdal
9th " " " " ..	Ambala.	28th " " " " ..	Rawal Pindi.
10th " " " " ..	Meerut.	29th " " " " ..	Karachi.
11th " " " " ..	Bareilly.	30th " " " " ..	Secunderabad
12th " " " " ..	Mhow.	31st " " " " ..	"
13th " " " " ..	Poona.	32nd Mule Corps for use with Cavalry B'de ...	Sialkot.
14th " " " " ..	Quetta.	33rd Mule Corps for use with Cavalry B'de ...	Kohat.
15th " " " " ..	Bangalore.	34th Pack Mule Cadre	Jhelum.
16th Pack Mule Cadre ...	Peshawar.	35th " " " " ..	Ferozepore.
17th " " " " ..	Rawal Pindi.	36th " " " " ..	Jullundur.
18th " " " " ..	"	37th " " " " ..	Meerut.
19th " " " " ..	"	38th " " " " ..	Ambala.
		39th " " " " ..	Karachi.
		41st Pony Train Cadre	Ambala.
		42nd " " " " ..	Bareilly.

B.—CAMEL CORPS.¹

Units.	Stations.	Units.	Stations.
50th Silladar ..	Campbellpore.	68th Hired ...	Bhera N.W.R.
51st " " ..	Rawal Pindi.	69th " " ..	Gujranwala.
52nd " " ..	Jhelum.	70th " " ..	Hissar.
53rd " " ..	Savgodka.	71st " " ..	Ferozepore.
54th " " ..	Lahore.	72nd " " ..	Ambala.
55th " " ..	Montgomery.	73rd " " ..	Quetta.
56th " " ..	"	74th " " ..	Multan.
57th " " ..	Multan.	75th " " ..	Dera Ghazi Khan.
58th " " ..	Quetta.	76th " " ..	Dera Ismail Khan.
59th Grantee ..	Lyallpur.	77th " " ..	Dera Ismail Khan.
60th " " ..	"	78th " " ..	Dera Ghazi Khan.
61st " " ..	"	79th " " ..	Quetta.
62nd " " ..	"	80th " " ..	"
63rd Hired ...	Kohat.		
64th " " ..	Lalla Musa.		
65th " " ..	Rawal Pindi.		
66th " " ..	Peshawar.		
67th " " ..	Jhelum.		

¹ The native establishment and animals for the Hired Camel Corps, which are only raised on mobilisation, are located and registered in peace by Transport Registration Officers.

ON SOME FUNCTIONS OF THE PROJECTILE FROM A SURGICAL ASPECT.

By C. MARSH BEADNELL, *Fleet Surgeon, R.N.*

IT would be no exaggeration to say that practically all organisms both in the vegetal and animal worlds have some means or other of defending themselves against the onslaughts of their natural enemies. Animals have not only a means of defence, but of offence as well.

In the hurry and bustle of modern times we are apt to look with unconcern, born of familiarity, on the most wonderful and ingenious machines without stopping a moment to reflect how and why they have come to be the beautiful and intricate pieces of mechanism they are. There is a direct continuity through incalculable and almost imperceptible changes from the primitive savage in the distant past blowing across the open end of a reed-stalk and the expert organist of to-day playing a complicated fugue on the organ. The modern grand piano is the twentieth century representative of a primeval taut string. In a similar way the weapons of offence and defence as exemplified in our modern ordnance have had a definite descent by modification from simpler, less differentiated forms.

The desired purpose of all weapons, whatever their nature, is destructive work; in other words, the expenditure of energy upon the somatic tissues of an adversary. Doubtless the most primitive injury ever inflicted by one organism upon another was that of simple impact; after enormous lapses of time certain parts of the organism became differentiated and specialised into spines, teeth, claws, horns, etc.; and the hurt of a simple impact gave place to the more effective hurt of impact *plus* penetration.

An obvious drawback to the use of such weapons as those just alluded to was that it necessitated the aggressor and his foe coming into actual contact, thereby exposing the former to the risk of injury at the hands of the latter. When, however, intelligence dawned on the stage of life in the person of primeval man, means were speedily taken to get over this difficulty. Experience taught that the heavier the impinging mass and the quicker it moved the greater was the amount of mischief that could be inflicted, and so the simple closed fist became replaced by the fist clenching a stick or stone, and, from this stage to the next, in which the contents of the fist were flung directly at the enemy, was one fraught with such obvious advantages that little hesitation could have been made in adopting it; even the apes of to-day appreciate the mechanical advantage of using cocoanuts and stones as missiles against their molesters.

Here, then, we have a body driven through the air by an impelling force. Within such a moving body or mass, which we may now term a projectile, the potential energy of muscle¹ has been transformed into molar energy ultimately destined to effect disintegrating changes within the tissues of an adversary. Such was the first intelligent use of the projectile as a belligerent implement.

However, at this stage prehistoric man was confronted with a serious check: unaided he could only lift a certain weight and could only give to that weight a very limited velocity. After a certain non-progressive period of marking time he suddenly awoke to the fact that a sapling when forcibly bent from the straight and then released would return to its original position with the display of a considerable amount of energy, and the idea struck him that such natural forces might well be harnessed. Acting upon this suggestion he proceeded to construct bows with which he shot forth arrows, catapults by means of which he threw out heavy javelins, and ballistae with which he hurled huge stones. Even then, however, the whole of the kinetic energy of the projectile had still to be obtained from the potential energy of his muscles, these instruments being merely receptacles for temporarily storing this energy up. Once again the weight and velocity limit was reached, and it was not until the discovery of gunpowder that a fresh and startling impetus was given to the science of ballistics.

The first discovery of gunpowder probably originated in the primeval methods of cooking food by means of wood fires on a soil impregnated with nitrates, as in many parts of India and China, for when the fires were extinguished a certain amount of charcoal would remain and get covered in the course of a few days with saltpetre, thus bringing into accidental contact two of the most active ingredients of gunpowder. Whenever a fire was rekindled in the same spot a deflagration ensued which could not fail to attract attention. The ancient Hindoos, long before the Christian era, knew the art of projecting heavy bodies by means of gunpowder, as the following paragraph from their

¹The potential or internal energy of the muscle-cell has, of course, been derived, like that of an engine, from outside sources. The living substance, or protoplasm of the muscle-cell exists in loose chemical combination with exceedingly complex and unstable substances derived and built up from less complex and more stable substances existing in the food-stuffs consumed by the animal. Given a certain stimulus, usually a nerve-impulse from the central nervous system, the muscle-cells respond, that is to say, the complex substances inside them suddenly break up, in fact, "explode," into simpler and more stable ones, and in this way energy is liberated, or, to be more correct, becomes transformed from the potential to the kinetic state. Just as several thousands of foot-pounds of energy may be liberated in a 12-inch gun by an insignificant pull upon an electric trigger, so the energy manifested by the muscles of an animal bears absolutely no quantitative ratio to the "stimulus" producing the responsive act of contractility.

code will show:—"The magistrate shall not make war with any deceitful machine, or with poisoned weapons, or with cannons or guns, or any kind of firearms, nor shall he slay in war any person born an eunuch, nor any person who, putting his arms together, supplicates for quarter, nor any person who has no means of escape."

By the use of this mixture the kinetic energy of the missile of war was obtained from the potential energy of an explosive quite irrespectively of the physiological energy of the warrior. Primitive cannon, "gunnis" and "bombardes" thereupon came into being, and it is worth noting that the first guns used were breech-loaders. In 690 A.D. the Arabs used cannon at Mecca, and in 1098 A.D. the Greeks had "fire-tubes" built into the prows of their war-boats. In 1449 A.D. hand-cannon were employed, which later gave way to the hand-culverins and hand-guns of the 15th century. In 1527 A.D. the Spaniards made use of arquebuses and matchlocks. In 1630 A.D. wheel-locks came into existence, but were soon ousted by the more handy flint-locks, which remained in use in the British Army until 1840 A.D. From the flint-locks emerged the muskets and later the breech-loading rifles—first the smooth-bore and then the rifled-bore—until the present stage of the modern small-bore magazine rifle was reached. The later phases of the evolution of the modern rifle are shown in Table I.

TABLE I.

Showing the Evolution of the Small-Bore Rifle.

In the year 1400 the Arabs	made use of a 1.250 inch bore rifle
1500 England	1.000
1500 "	0.750
1549 "	0.750
1550 "	0.698
1552 "	0.577
1554 Austria	0.550
1560 Sweden	0.488
1566 France	0.433
1567 Austria	0.420
1569 Switzerland	0.400
1578 Sweden	0.396
1579 Turkey	0.350
1588 Austria	0.315
1588 Germany	0.311
1589 England	0.303
1589 Belgium	0.301
1589 Switzerland	0.295
1592 Spain	0.276
1592 Holland	0.256
1595 United States	0.236

The rifle is a thermodynamic machine which does its work in a single stroke and in which the potential energy of an explosive is converted into the kinetic energy of a moving projectile. Rifles may be classified according to the method in which charge and projectile are inserted as muzzle-loading and

breech-loading, according to the diameter of the bore as large- and small-bore, according to the condition of the internal barrel as smooth- or grooved-bore, according to their firing capacity as single-shot and repeating.

Muzzle-loading and smooth-bore rifles are already obsolete. Single-shot and large-bore rifles are still hovering about the borderland between ancient and modern, but the universal tendency, both in big game shooting and warfare, is towards the adoption of the small-calibre rifle with a repeating system.

It would be out of place in such a paper as the present to enter into an elaborate description of any rifle, but the writer craves the reader's indulgence while he just touches upon some of the cardinal points of those weapons which have come under his personal observation in the Filipino-American and Anglo-Boer wars.

The *Snider* rifle was a not uncommon weapon in the hands of our late enemy. It has a calibre of 0.577 inch and fires a bullet of 480 grains with a charge of 70 grains of black powder. The barrel is 39 inches long and rifled by three grooves with a right-handed twist of one turn in 78 inches. The initial velocity is 1,240 f.s., the remaining velocity at 2,000 yards is only 196 f.s. The projectile has a hollow base, which renders it peculiarly deformative in character.

The *Springfield* rifle was the dreaded "Long Tom" used by the Americans against the Filipinos. It is a 0.45-inch rifle with a barrel of 32.50 inches in length, furnished with three grooves, making one complete turn in 22 inches. Seventy grains of common powder give a 500 grain bullet a muzzle velocity of 1,301 f.s., which falls to 404 f.s. at 2,000 yards.

The *Remington* rifle was the principal weapon used by the Filipinos. The barrel is a little over 35 inches in length, and possesses five right-handed spirals making one complete turn in 20 inches. The charge is 80 grains of black powder for firing a 0.44-inch bullet with an initial velocity of 1,340 f.s., which drops to 350 f.s. at 2,000 yards. This bullet is sheathed with brass.

The *Martini-Henri* rifle was sometimes used by the Boers in the late war. The barrel is 33.18 inches long and has seven grooves with a right-handed twist of one turn in 22 inches. A 480-grain bullet is given a muzzle velocity of 1,315 f.s. by means of 85 grains of black powder and a remaining velocity, at 2,000 yards, of 389 f.s.

The *Lee-Metford* and *Lee-Enfield* rifles are for practical purposes the same, with the exception that the former carries eight cartridges and has seven grooves, the latter is 4 ozs. lighter and holds 10 cartridges and has five grooves, which are narrower and deeper than those of the Lee-Metford. These rifles have a left-handed twist of one turn in 10 inches, the barrel is 30.2 inches long. A 0.311-inch bullet weighs 215 grains and has a m.v. of 2,060 f.s. 30.5 grains of cordite give a chamber pressure of 33,600 pounds.

The *Mauser* rifle was used by the Filipinos and the Boers in the late campaigns. It has a 29-inch barrel with four grooves, which are left-handed in the 1892 pattern and right-handed in the 1896 pattern. The bullet has a short diameter of 0.284 inches and weighs 172 grains; 38 grains of nitro-cellulose give a chamber pressure of 48,800 pounds.

The *Krag-Jorgensen* rifle was used by the Americans in their recent campaigns. It has a 30-inch barrel with four right-handed grooves having an inclination of one turn in 33.3 calibres. The calibre of the bullet is 0.308 inch, and it weighs 219 grains. The charge of 41.5 grains of nitro-cellulose gives a chamber pressure of 17 tons and a muzzle velocity of 1,880 f.s.

The *Lee Straight-Pull* was also used by the Americans, more especially by their navy. The barrel is 28 inches by 0.236 inch, and has six right-handed grooves with an angle of twist equal to 5 degrees 26 minutes, or one turn in 31.8 calibres. The projectile weighs 112 grains and has a calibre of 0.243 inch. 32.4 grains of nitro-cellulose give a chamber pressure of 22 tons and an initial velocity of 2,600 f.s.

The *Mannlicher* rifle was much used by the Boers in South Africa. The barrel is 31.1 inches long and has a calibre of 0.256 inch. It has four right-handed grooves making one complete turn in 31.8 calibres. 36 grains of Troisdorf give a 0.263-inch bullet of 162 grains a muzzle velocity of 2,555 f.s. The chamber pressure is 52,640 pounds.

Let us now relinquish the specific for the general. Rifling consists in the removal of longitudinal strips of metal from the internal surface of the barrel in such a way that the grooves left may be either straight, that is, parallel to the long axis of the bore, or curved, forming a helix round the long axis of the bore. The original object of the grooves was to accommodate fouling, but their present function is to compel the bullet to revolve about a long axis. Any number of grooves from two to twelve may be present, but four is the usual number; the Express rifle has eight, the Lee-Metford seven, the Lee Straight-Pull six, the Lee-Enfield five, the Mannlicher four, the Schmidt-Rubin three and the Cape rifle two grooves.

The direction of the rifling may be right or left-handed; the Lee-Metford is an example of the latter, the projectile revolving about an axis of magnitude in such a way that, looked at from the firer's point of view, the radii of the circle formed by its transverse section move against the hands of a clock. The Mannlicher rifle has right-handed grooving and its bullet therefore revolves clock-wise, that is, the radii of its cross-section, viewed from behind, move with the hands of a clock.

The devices for compelling the projectile to rotate about its long axis and prevent it from slipping across the "lands" of the piece are various, e.g. :—

1. Coating the surface of the bullet with a soft metal into which the "lands" of the rifle may cut.

2. Fixing bands of soft metal around the base of the bullet.
3. Fixing studs into the projectile which fit into the grooves of the piece.
4. Making the base of the projectile hollow so that the pressure caused by the explosion may expand the cavity and force the metal into the grooves. The Pritchett bullet is a case in point.
5. By fixing a hard plug of clay or wood (as in the Snider) or a metal cup (as in the Minié) in the base of the bullet so that the force of the explosion driving the plug into the softer metal of the projectile forces the base of the latter into the rifling.
6. By fixing lateral flanges to opposite sides of the bullet which fit into corresponding grooves in the rifle. The author picked up several of these bullets, known as the "Cape rifle bullet," in Paardeburg laager. They were used by the Boers for sporting purposes.
7. By making the calibre of the projectile larger than that of the rifle as measured across the "lands." This is the modern method with sheathed bullets, the lands of the rifle cutting into the mantle of the bullet; for instance, the diameter of the Mannlicher bullet is 0.2367 inch, whereas the calibre of the rifle is 0.2569 inch.

Speaking generally, the longer the bullet and the smaller its short axis the more sharp must be the twist of the rifling, or, in other words, as the ratio of the long to the short diameter of the bullet is increased the pitch of the screw must be diminished.

The following table (Table II.) shows at a glance the increase of twist that has supervened in succeeding years.

TABLE II.
*Showing the Progressive Increase of Rotary and Translatory Speed
Concomitant with the Progressive Decrease of Calibre.*

Year.	Rifle.	Muzzle Velocity.	Bore in Inches.	Twist.	Revolutions per Second.
1865	Snider ...	1240	0.577	1 in 78.0	190
1869	Martini-Henry ...	1316	0.450	1 in 32.0	717
1889	Lee-Metford ...	2008	0.303	1 in 10.0	2400
1898	Mannlicher ...	2427	0.256	1 in 7.8	8702
1895	Lee Straight-Pull	2500	0.236	1 in 7.0	4385

When a rifle is fired the following four principal movements occur:—

1. Translation.
2. Rotation.
3. Undulation.
4. Flexion.

These movements we will now proceed to discuss separately and somewhat in detail.

1. *Translation.* A backward movement known as *recoil* begins directly the bullet advances along the bore of the rifle, in fact the rifle is actually driven off the bullet towards the rear. Recoil depends upon the weight of the rifle and projectile, the velocity imparted to the latter and the friction to which it is subjected within the bore. The recoil energy of the old Martini-Henry was considerable, being about 14 foot-pounds as contrasted with $5\frac{1}{2}$ foot-pounds for the Lee-Metford.¹

Now the greater part of this energy is absorbed by the firer's right shoulder, and after many days' prolonged firing the bruising effects are considerable, especially in soldiers of slender build. The writer has seen men in action firing, not only from the left shoulder, but from the armpits and even from the hips on account of pain, swelling and tenderness set up by the powerful recoil of the older and heavier type of fire-arm.

2. *Rotation.*

a. Consequent upon the reaction to the force expended in imparting rotation to the projectile is produced a rotation, in an opposite direction, of the rifle itself. Unless the weapon be held loosely at the instant of pulling the trigger this movement is not perceptible, being unconsciously checked by the momentary contraction of the firer's pronator or supinator muscles, according to the direction of the twist of the rifling. Now since the supinators are the stronger of these two sets of muscles we have a scientific vindication of the right-handed spiral.

b. There is also a slight rotation of the muzzle independently of the breech, a kind of "rotary flipip."

3. *Undulation.* The pressure exerted upon the internal surface of the barrel is considerable. For instance, in the Mauser rifle it is 51,000 lbs. per square inch. In consequence of this pressure there is a dilation of the barrel which takes the form of a wave advancing from breech to muzzle, the crest of

¹ The formula for calculating the energy and velocity of recoil is:—

$$E = \frac{W}{2} \left(\frac{w v}{W} \right)^2$$

and $V = \frac{w v}{W}$ since the momenta are equal.

In this formula E represents the energy of recoil in ft. lbs.
 v " " velocity of recoil in f.s.
 w " " weight of the rifle in lbs.
 W " " weight of the bullet in lbs.
 v " " muzzle velocity.

the wave following in the wake of the base of the bullet. Any tight ring around the barrel will interfere with the progress of this wave, in fact, will cause it to "break," with the result that the barrel is ruptured with perhaps disastrous consequences to the firer.

4. *Flexion.*

a. *Vertical "Jump."* Since the centre of gravity of the rifle is below the long axis of the bore, a thrust backwards along this line must throw the barrel in an upward direction, the rifle rotating in a vertical plane about an axis which is the point of contact with the shoulder. It is measured by the angle in a vertical plane between the axis of the piece before firing and the line of departure of the bullet.

b. *Vertical "Fillip."* In vertical jump there is a lagging behind of the muzzle, which has to describe a larger arc than the breech. Consequently the long axis of the barrel assumes a curve with the convexity upwards. Vertical fillip might be defined as the angle in a vertical plane between a tangent to the long axis of the barrel at the breech and the line of departure.

c. *Lateral "Jump."* In most rifles the centre of gravity is not in the median vertical plane, but to one side of it; in this way a lateral jump is produced, being the angle in a horizontal plane between the axis of the piece before firing and the line of departure.

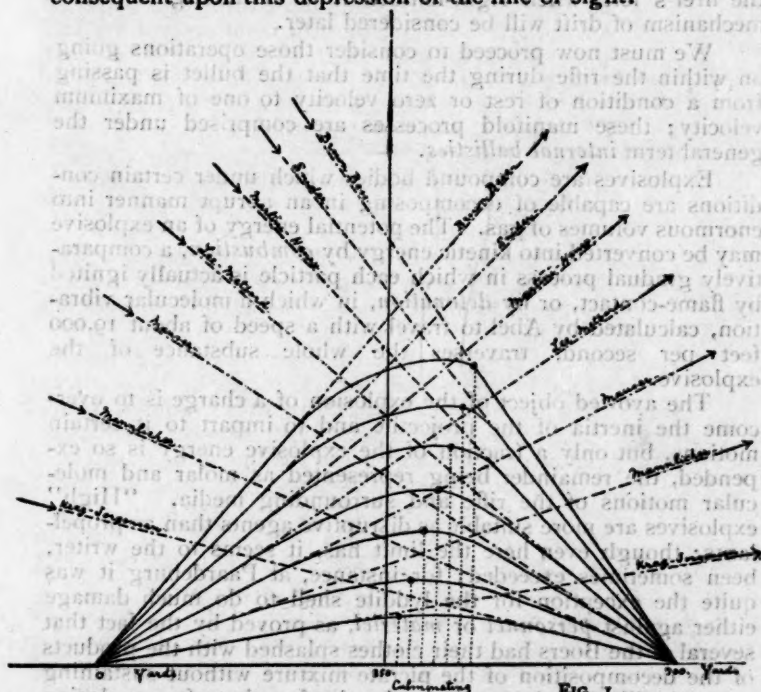
d. *Lateral "Fillip."* For a similar reason to that mentioned under lateral jump, a lateral fillip is produced, and its amount is indicated by the angle in a horizontal plane between the axis of the piece before firing and the line of departure.

There are only two occasions in which a rifle bullet travels in a straight line, to wit, when the line of departure is vertically upwards or downwards, the trajectory then being the shortest distance between the muzzle and the point of impact. On all other occasions the line of departure is towards a point situated above the objective and the trajectory is a curved line. This elevation, as it is termed, is necessary in order to neutralise the fall of the projectile due to gravity: this fall is considerable, being as much as six feet in 300 yards, or 1,000 feet in 2,500 yards.

Many factors have to be taken into consideration in calculating elevation, *e.g.*, the temperature and pressure of the atmosphere and the amount of moisture either suspended or dissolved in it; the velocity and direction of air currents and—a point of theoretical import only, at any rate as regards rifle projectiles—the earth's rotation. The immense importance of temperature and pressure as factors bearing on accuracy of shooting was forcibly brought home to us in South Africa,

where our rifles, originally sighted for 60 degrees Fahr, and normal sea-level pressure, had to be used at a height of 5,000 or more feet with the thermometer hovering around 90 degrees.

In consequence of the universal tendency during recent years towards the adoption of narrower and more elongated projectiles there has been, for any given range, a parallel diminution in the amount of elevation required. The following diagram (Fig. 1) shows the increase of dangerous zone consequent upon this depression of the line of sight.



In Fig. 1, which is, of course, purposely exaggerated and purely diagrammatic, it will be seen that for a range of 700 yards the old Brown Bess bullet had a dangerous zone of 50 yards, i.e., 7.1 per cent. as compared with the modern Krag-Jorgensen bullet, which for a range of 700 yards has a dangerous zone of 700 yards, i.e., 100 per cent. Taking other rifles into consideration, we find that for a range of this distance the dangerous zones are as follows:—

Brown Bess	...	...	750 in. bore	...	50 yds.	7.1 per cent.
Snider	...	...	...	...	150 "	21.4 "
Martini-Henry	...	...	...	...	200 "	28.5 "
Lee-Metford	...	...	...	...	400 "	57.1 "
Mauser	...	...	...	...	630 "	90.0 "
Mannlicher	...	...	...	...	650 "	92.8 "
Krag-Jorgensen	...	...	...	...	700 "	100.0 "

At 1,000 yards range in a calm atmosphere it will be found that a Lee-Metford bullet has an error of about three feet to the left, the Mauser bullet has an approximately similar deviation to the right. The cause of this error is three-fold, lateral fillip and jump (which have just been discussed) and "drift"—a movement of the projectile due to its rotation about a long axis. The direction of the drift depends upon the inclination of the spiral of the rifle; when this is left-handed the derivation is to the firer's left; when right-handed it is to his right. The mechanism of drift will be considered later.

We must now proceed to consider those operations going on within the rifle during the time that the bullet is passing from a condition of rest or zero velocity to one of maximum velocity; these manifold processes are comprised under the general term *internal ballistics*.

Explosives are compound bodies which under certain conditions are capable of decomposing in an abrupt manner into enormous volumes of gas. The potential energy of an explosive may be converted into kinetic energy by *combustion*, a comparatively gradual process in which each particle is actually ignited by flame-contact, or by *detonation*, in which a molecular vibration, calculated by Abel to travel with a speed of about 19,000 feet per second, traverses the whole substance of the explosive.

The avowed object of the explosion of a charge is to overcome the inertia of the projectile and to impart to it certain motions, but only a fraction of the explosive energy is so expended, the remainder being represented as molar and molecular motions of the rifle and surrounding media. "High" explosives are more suitable as disruptive agents than as propellants; though even here the limit has, it seems to the writer, been sometimes exceeded; for instance, at Paardeburg it was quite the exception for the lyddite shell to do much damage either against *personnel* or *matériel*, as proved by the fact that several of the Boers had their clothes splashed with the products of the decomposition of the picrate mixture without sustaining severe bodily injuries, and also by the fact that after explosion the fragments of the shell seldom travelled far, being usually found huddled together in and close around the site of the explosion, as though the rise of pressure within the shell cavity had been so sudden that sufficient time was not allowed to overcome the inertia of the shell fragments. It is expected, however, that in a naval war very different results would ensue from the use of lyddite; bursting inside the comparatively circumscribed spaces of casemates or "tween-decks" the sudden rise of pressure consequent on the production of enormous volumes of gases would play havoc with the surrounding structures and kill all those in the immediate vicinity; moreover, the asphyxiating character of the products of explosion would convert all adjacent compartments into veritable lethal chambers.

With "low" explosives there is a comparatively gradual rise of pressure within the chamber of the rifle, but long before the combustion of the charge is completed the projectile begins to move towards the muzzle of the rifle with accelerating velocity, and although the chamber pressure begins to fall before the projectile has left the muzzle, combustion is still going on and gas being generated the whole time it is advancing down the barrel.

Were the projectile fixed and immovable the pressure in the chamber of an ordinary rifle would rise to about 100,000 lbs. per square inch, but the moment the projectile begins to move space is increased and the pressure of those gases already formed falls, though the total pressure is still rising. The chamber pressure of the Mauser and Lee-Metford rifles respectively are 51,000 lbs. and 42,000 lbs. to the square inch, and the corresponding pressures upon the base of these projectiles are respectively 2,625 lbs. and 2,982 lbs. chamber thrusts.¹

The ideal propellant is one which is burning the whole time the projectile is in the barrel of the rifle, but which has its last grain ignited as the projectile leaves the muzzle. A hard and fast line cannot be drawn between powders that decompose by detonation and those that decompose by conflagration, and even the same powder may behave differently in this respect under different conditions; for instance, a rise of temperature and pressure increases the rapidity of decomposition, and a powder that under normal conditions "burns" may have its surrounding temperature and pressure so raised that the latter part of the charge "detonates" and in this manner most grave injuries have resulted from the bursting of the gun or rifle, more especially with the use of sporting powders.

In South Africa during the late war the cartridge cases of some of the guns got raised by the sun to so high a temperature that it was impossible to manipulate them with the naked hand; when such cartridges were fired it was noticed that the projectiles

¹ The mean thrust upon any projectile may be calculated by the following formula :—

$$T = \frac{M V^2}{2g(l-c)}$$

Where T = mean thrust in pounds upon base of bullet.
 " M = weight of bullet in lbs.
 " V = muzzle velocity in feet-seconds.
 " g = gravitation force.
 " l = length of barrel in feet.
 " c = length of charge in feet.

For the Lee-Metford bullet T = 824 lbs., and for the Mauser bullet T = 845 lbs.

invariably overshoot the mark, but our gunners were not long in making the requisite diminution of elevation.¹

When we have to deal with pressures of 40,000 lbs. to 50,000 lbs. to the square inch (in fact, in the Parravicino-Carcano rifle of the Italians the pressure amounts to as much as 60,000 lbs. per square inch) it is not surprising that the energy of the modern bullet is so marked. We must, however, be careful to distinguish between energy and momentum; for instance, a 215 grain Lee-Metford bullet with a velocity of 2,000 f.s. has the same momentum as an Express bullet of twice this weight and half this speed, but the energy of the Lee-Metford bullet is double that of the Express. The amount of motion a projectile possesses is termed its momentum, its capacity for doing *work* is called its energy, double its mass and the energy is duplicated, but double its velocity and a fourfold increase in the bullet's capacity for doing work is obtained.

The bullet has its maximum energy at the moment that its base is in the act of leaving the muzzle; the following diagram (Fig. 2) is intended to show the relation existing between the pressure upon the base of the bullet and its velocity and energy while travelling down the bore of the rifle:—

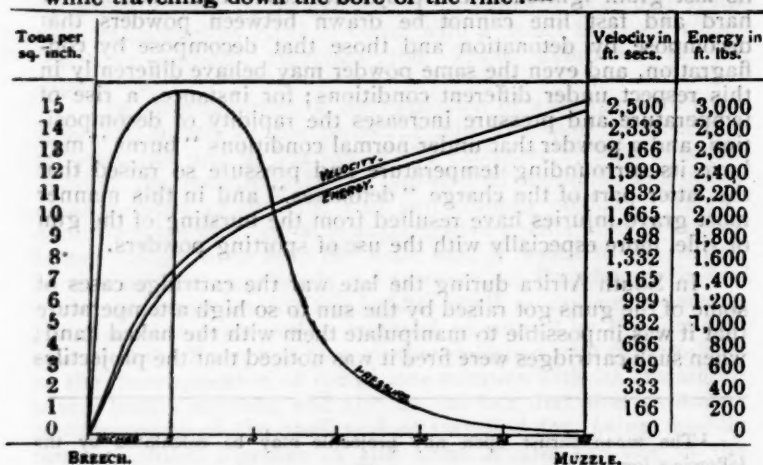


FIG. 2.

Diagram showing velocity, pressure and energy curves of a bullet in its passage down the rifle barrel.

¹ The effect of temperature upon the pressure exerted by an explosive has been shown in a most vivid manner by Noble. He exploded, in a closed vessel, 28 ozs. of cordite, noting the pressure after certain intervals of time, thus:—

After 0.07 seconds the pressure was 6 tons per square inch.

0.17	"	5	"
0.73	"	4	"
1.76	"	3	"
3.32	"	2	"
7.08	"	1	"

The actual amount of *work* capable of being done by the modern small-bore bullet upon the animal economy is very considerable, from 1,800 ft. lbs. to 2,800 ft. lbs. With hard-sheathed bullets only a small fraction of this work is, under normal conditions, expended upon the somatic tissues; with bullets which are devoid of a mantle or possess one that has been purposely weakened at certain points, or again in sheathed missiles suffering from aberrations of flight, errors of form or a want of homogeneity in structure, the whole of the energy may be converted into destructive work performed upon the anatomical elements. In civilised warfare the former condition is aimed at, the ideal being to place the enemy temporarily out of action without condemning him to become a permanent cripple; in war against fanatical tribes and in big-game shooting, the latter condition is contemplated, we hope to kill and to kill quickly.

Since the bullet's energy decreases with the distance covered and since the capacity of the bullet for doing work of a harmful nature upon the living body depends directly upon the energy with which it is endowed at the moment of impact, it follows that if the soldier, the sportsman or the surgeon wishes to be able to predict the particular traumatic phenomena that may be exhibited in the body of the victim at various ranges he must have a clear idea what the energy of the projectile will be after it has covered any definite distance; in short, a knowledge of the *remaining energy* of the bullet at any point of its flight is absolutely essential. Let us take the 0.256 inch Mannlicher bullet as an example; at the muzzle this missile can strike a blow of 1,581 ft. lbs., at 500 yards the energy is only 568 ft. lbs., at 1,000 yards it is 257 ft. lbs., at 2,000 yards it is 86 ft. lbs., and at 3,000 yards the exhausted bullet can scarce strike a blow of 30 ft. lbs.

(To be continued.)

STUDIES IN APPLIED TACTICS.
CAVALRY IN BATTLE (15TH AND 16TH AUGUST, 1870).

By **P. LEHAUTCOURT.**

Translated by permission from *Le Journal des Sciences Militaires*,

By Major E. MAKINS, D.S.O., 1st Royal Dragoons.

Continued from August JOURNAL, p. 1092.

XII.

THE TOURNAY OF VILLE-SUR-YRON.

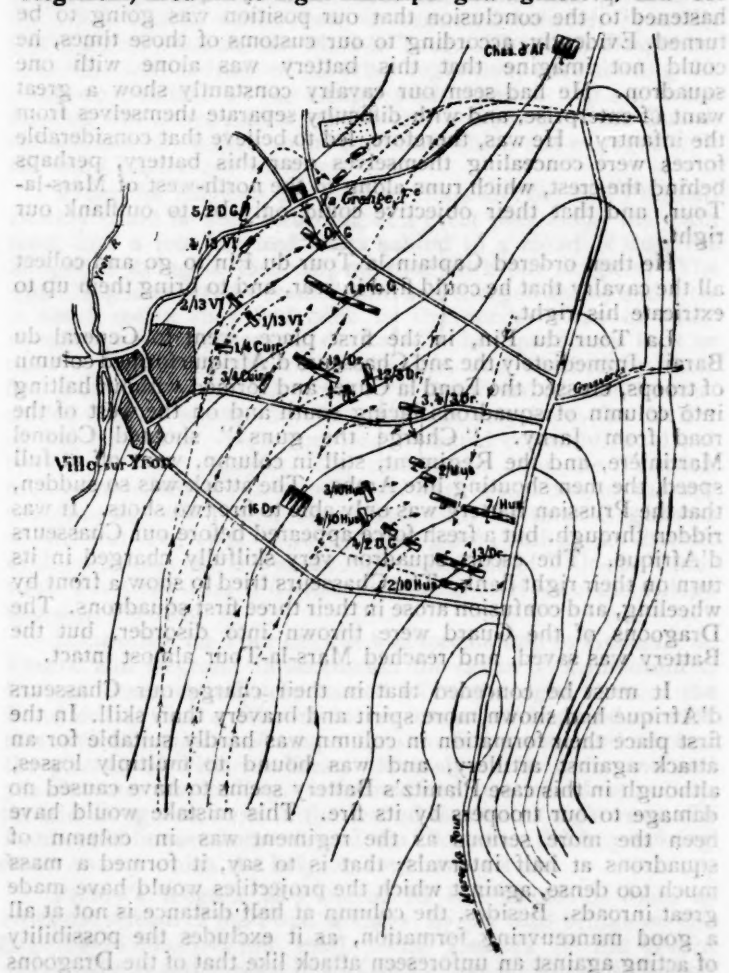
WE have mentioned that at the moment when General von Voigts-Rhetz gave the 38th Brigade the order to attack (3.23 p.m.), he announced his intention of supporting the German left with all the cavalry. For the time being the four squadrons of the 2nd Dragoons and the 1st Horse Battery of the Guard, alone advanced to the north by the road from Mars-la-Tour to Jarny, under the command of Colonel von Finckenstein. At 4.30 p.m. the battery took up its position about the point 250 to the north-west of Mars-la-Tour, and opened fire against the masses of cavalry, which complacently exposed themselves on the slopes to the Grizières Farm.

This cavalry was the main body of Legrand's Division. The 1st and 7th Hussars and the 3rd Dragoons were in two lines level with the farm. The 11th Dragoons were still behind the centre of the 4th Corps.

The third shell from the Prussian battery got the range of the 7th Hussars, and was followed by others, so that General Legrand decided to change his position. Meanwhile the two batteries to the right of Cisse's Division (5th and 9th of the 15th Regiment) replied to this fire without inflicting any loss on the enemy's battery; but on the other hand, the escorting squadron, doubtless in a bad position, lost 11 horses.

Legrand's Division took cover in a fold of the ground to the north of the Grizières Farm. But Planitz's Battery galloped along the Jarny road until level with Ville-sur-Yron, and from there took our squadrons again as a target (at 4.45 p.m.).

Luckily a company of the 64th came out of the farm, and firing some well-aimed shots at the battery, in a very short time inflicted on it a loss of three men and seven horses. In the end two batteries of du Barail's Division (5th and 6th of the 19th Regiment) fired six or eight shells per gun against it, and then



turned on the cavalry, which debouched from Mars-la-Tour. Just as they had got the range, they received orders to retreat in order to leave the ground free for the cavalry. They then remained as spectators only of the big engagement, which was about to follow, a fact which must always be regretted. General du Barail, with all his dash and in spite of the cavalry spirit which he possessed, and which is brought out in his very

interesting memoirs, did not know how to make use of his horse artillery batteries.

At this moment Ladmirault, who had been told of the cavalry movements at Mars-la-Tour, went to the Grizières Farm. He was present when Planitz's Battery opened fire, and hastened to the conclusion that our position was going to be turned. Evidently, according to our customs of those times, he could not imagine that this battery was alone with one squadron. He had seen our cavalry constantly show a great want of enterprise, and with difficulty separate themselves from the infantry. He was, therefore, led to believe that considerable forces were concealing themselves near this battery, perhaps behind the crest, which runs along to the north-west of Mars-la-Tour, and that their objective could only be to outflank our right.

He then ordered Captain la Tour du Pin to go and collect all the cavalry that he could find in rear, and to bring them up to extricate his right.

La Tour du Pin, in the first place, went to General du Barail. Immediately the 2nd Chasseurs d'Afrique formed column of troops, crossed the Fond la Cuve, and formed without halting into column of squadrons facing south and on the west of the road from Jarny. "Charge the guns!" shouted Colonel Martinière, and the Regiment, still in column, went off at full speed, the men shouting like Arabs. The attack was so sudden, that the Prussian Battery was only able to fire two shots. It was ridden through, but a fresh force appeared before our Chasseurs d'Afrique. The escort squadron very skilfully charged in its turn on their right flank. The Chasseurs tried to show a front by wheeling, and confusion arose in their three first squadrons. The Dragoons of the Guard were thrown into disorder, but the Battery was saved, and reached Mars-la-Tour almost intact.

It must be conceded that in their charge our Chasseurs d'Afrique had shown more spirit and bravery than skill. In the first place their formation in column was hardly suitable for an attack against artillery, and was bound to multiply losses, although in this case Planitz's Battery seems to have caused no damage to our troopers by its fire. This mistake would have been the more serious as the regiment was in column of squadrons at half intervals; that is to say, it formed a mass much too dense, against which the projectiles would have made great inroads. Besides, the column at half distance is not at all a good manœuvring formation, as it excludes the possibility of acting against an unforeseen attack like that of the Dragoons of the Guard.

It seems, therefore, that it would have been preferable to have sent one of the two squadrons in line against the battery, and to have held the others in reserve ready to charge the support. Formed in squadron column behind the right of the others, they would have possessed sufficient mobility to have quickly shown a front to a fresh adversary.

A fresh group of German cavalry then came on the scene. It was at 3.30 p.m. that Voigts-Rhetz had ordered General von Rheinbaben to advance *via* Mars-la-Tour in the direction of Jarny to envelop the French right. In consequence of delays difficult to justify, it was one hour afterwards that portions of the 5th Division, which were concentrated between Tronville and Puxieux, started for Mars-la-Tour. The 13th Dragoons, who were well in front of the other regiments, were skirting the south-west salient of the village a little before 5 p.m., when Colonel von Finckenstein, of the 2nd Dragoons of the Guard, came to ask for support to the squadron which was engaged with the 2nd Chasseurs d'Afrique.

From the ridge to the west of Mars-la-Tour the Prussian Battery could be seen returning at a great pace along the main road, and a few hundred paces behind in a cloud of dust the Dragoons flying in disorder, mingled with our troopers. The 13th Dragoons rapidly formed line and charged them, and after a short *melée* they fled back to the north. One of their squadrons, which General de Lajaille had prudently kept in reserve, formed line in extended order, and checked by their fire, it is said, the pursuit of the 13th Dragoons. It must be concluded that the aforesaid pursuit was not very keen; for the fire of this Squadron which remained mounted certainly could not have been very straight. The real reason that the Prussian horsemen halted appears rather to have been due to the appearance of fresh French squadrons, viz., the three Regiments of General Legrand. The 13th Dragoons rallied on the left of the squadron of the Guard to the south-east of Ville-sur-Yron, while our Chasseurs d'Afrique re-formed level with the village and near the road.

Meanwhile La Tour du Pin had transmitted to Generals de France and Legrand in succession the order of Ladmirault's. Both of them immediately started off to the right to cross the Fond de la Cuve. The three regiments of Legrand crossed this ravine in column of troops, then the Jarny road, and reached the plateau of Ville-sur-Yron. Montaigu's Brigade, 2nd and 7th Hussars, was leading. It formed line by a left wheel in line; the 3rd Dragoons were in the second line to its right rear. In front could be seen some way off the Chasseurs d'Afrique firing on an enemy which the brigade could not yet see.

France's Brigade had started off in columns of fours to cross the stream of the Fond la Cuve by the road bridge on the Bruville—Ville-sur-Yron road. The Lancers of the Guard were leading, and formed in line on the left facing south before reaching the Grange farm. The Empress's Dragoons, who followed some way behind, took the same formation almost at the same spot.

These preparatory movements, made almost with rigid precision, as was then the custom in our cavalry, lasted for rather a long time. General du Barail grew impatient, and remarked to General de Montaigu that the moment would be favourable

to go to the rescue of the Chasseurs d'Afrique. It was evidently the thing to do, but Montaigu said, none the less, that he must await the orders of his Divisional General, who, without doubt, was delayed in crossing the ravine. The latter arrived at last.

During this time some lines of German cavalry could be seen forming up in perfect order. Now or never would have been the time for du Barail's Battery to have fired on them, but the batteries had been sent away as impedimenta. The moment for another charge had already passed. "Some minutes ago," said du Barail to Legrand, "I advised General de Montaigu to charge, in order to profit by the disorder into which my Chasseurs d'Afrique had thrown the German ranks. Now it is too late, the moment is gone by." "It's all the same to me," said General Legrand, "I have been commanded to charge and I am going to." "Under these circumstances I shall support you with the Guards Brigade."

"I galloped to General France and told him to charge." "But we belong to the Guard; we are not under your orders."

"Oh! there is no longer any Guard here, bring your lances to the 'engage' and charge. I give you the formal order."

It can be seen what the traditions of routine were in our cavalry, and how it lacked dash and initiative in its highest ranks. It was the same with the German cavalry generals (namely, Rheinbaben and the Duke of Mecklenbourg), but their squadrons were more skilful and their subaltern officers showed much more judgment than ours did.

Captain la Tour du Pin, who accompanied General France, was able to point out a line of the enemy's cavalry at a short rifle range distant. He returned to satisfy Legrand of the assistance of this Brigade, at the same moment as another aide-de-camp of Ladmirault's, Lieutenant Neil, brought the General the order not to delay any longer. Colonel Carrelet of the 2nd Hussars asked permission to begin the action with the carbine against the enemy, who was seen some 800 metres away, halted on the crest. "Certainly not! with the sword!" answered Legrand; and on his order General de Montaigu started off his Brigade, which soon took up the pace of the gallop. From the beginning the pace was too fast to cover such a distance on a rising gradient.

During these pusillanimous preliminaries the German cavalry had continued to move to the north and had begun its deployment. Hedges, ditches, and plough-land to the south-west of Mars-la-Tour, made the march of Barby's Brigade distinctly slow, in spite of the great intervals between his regiments. The meeting also with the fugitives of Schwartzkoppen helped without doubt to hinder it. At 5.45 p.m. the 19th Dragoons were massed to the south of Ville-sur-Yron; the 13th Uhlans and the 4th Cuirassiers then came upon their left. The 10th Hussars and 16th Dragoons arrived from Puxieux in rear of their right.

Barby's intention was to attack our front with the 19th Dragoons, while the 13th Uhlans and the 4th Cuirassiers were to charge our right flank. But seeing that our deployment was still unfinished, he started off the 19th Dragoons before the two other regiments had come up. It was in vain that they tried to catch up the 19th by a long gallop.

However, the Hussars of General Montaigu almost immediately took up the pace of the charge. The command "Charge," was made at least 600 metres from the enemy's cavalry, and our troopers thus ascended the slopes towards the crest, where the forms of the 13th Prussian Dragoons were silhouetted against the sky. Their right was several hundred paces from the west of the Jarny road, along which our Hussars were going. In order to avoid being taken in flank, Colonel von Braschwitz, trusting in the mobility of his men, which was so superior to ours, made them go "troops right wheel," and started them at the trot to gain ground in this direction. This movement, which would have been dangerous in the face of a more mobile adversary, was made without difficulty, and with such precision that it caused a moment of hesitation and almost a halt in our ranks: "It is the Guard," our men cried. We have related elsewhere that on the 7th of August at St. Avold our men cried out, seeing some infantry marching in the distance in the most perfect order: "They are Prussians, only the Prussians can march like that," when it was only Castagny's Division of the 3rd Corps.

In the present case we were quickly undeceived. The Prussian Dragoons rapidly went "left wheel" into line, and charged.

Their left squadron, seeing our right incline with the evident intention of outflanking them, had already wheeled to the left. Our squadrons then took up the "forward" direction again, and the result was that the five Prussian squadrons presented a line with large intervals, a thing which also existed with us to a lesser extent. In the place of being outflanked by our eight squadrons, the Prussian lines outflanked them and bore down on our right flank. On the other hand, we outflanked the Prussians' right. Already some of the better mounted officers of the Hussars had ridden through the opposing line. "The shock was terrible," writes General Bonie. "The bulk of our little horses, blown by the length of the gallop, broke up against the solid wall, which our enemy opposed to them. In the twinkling of an eye they were amongst each other. General Montaigu, who was one of the first to enter the German ranks, was wounded, and thrown out of his saddle. He was soon taken a prisoner.

Meanwhile the 19th Dragoons continued their movement against the Lancers of the Guard, who were still halted. All at once the former saw themselves threatened on their right flank. General Legrand, with the 1st and 2nd Squadrons of 3rd Dragoons, had followed at first in reserve on the right of the 2nd Hussars. When the 19th Dragoons appeared, he advanced

level with Montaignu's Brigade and charged immediately; his staff followed him in single rank. Like those of the Hussars, the horses of our Dragoons reached the enemy rather blown. Nevertheless, there was a downright shock. The two lines went through each other, and the front ranks were broken up to a great extent. A furious *melée* commenced, which, it has been said, lasted half an hour. The brave Legrand was killed, his chief staff officer, Colonel Camponon, was wounded while displaying the most brilliant courage.

The right squadron of the 19th Dragoons had quickly wheeled to the right in order to show a front to the 3rd and 4th Squadrons of the 3rd Dragoons, who supported the former under the leadership of Colonel Bilhau.

The three other German squadrons continued at the trot, then broke into a gallop and charged. They formed such a regular line with such coolness, that, amid the surrounding dust, General France thought that he had Frenchmen in front of him. Finally Colonel Latheulade shouted out, waving his sword, "There they are: charge!"

The Regiment had hardly time to form line as the enemy was so close, perhaps less than 100 metres away. Nevertheless, the Lancers charged the enemy's line with remarkable dash, and, riding through it, overthrew a great part of the first rank; the Prussian Dragoons passed through also in the intervals.

But the 13th Uhlans had formed in rear of the 19th Dragoons. Preceded by General von Barby (the only German General Officer who took part in this memorable engagement), they charged in its turn the Lancers of the Guard. At the same time the 4th and 5th Squadrons of our 3rd Dragoons, after having ridden through the Squadron of the 19th Dragoons, which was opposed to them, threw themselves into the *melée*, where the French lancers and Prussian dragoons were struggling. Here occurred a deplorable mistake. The Lancers of the Guard were wearing their blue undress kersey instead of their well-known white tunic; the Dragoons took them for Uhlans and sabred them in spite of their cries: "Look out, we are French." "No quarter," answered the Dragoons. The confusion was great and the enemy profited by it. A part of the first squadron of the 13th Uhlans hurled themselves against the troopers of the 3rd Dragoons, who had ridden through the 1st Squadron of the 19th Prussian Dragoons. The remainder, by a half wheel to the right, took the Lancers, who had enveloped this same regiment, in the right flank. The 2nd Squadron went for a part of the Empress's Dragoons.

General France had noticed the move of the 13th Uhlans; he feared that they would take the Lancers in flank, and launched the Dragoons against them. The Dragoons just formed line on the left almost on the same spot as the Lancers had. Two of their squadrons went for one of those of the 13th Uhlans (the 2nd), after having fired at it more than a 100 shots, "which produced great effect," as the regimental records assure us.

The 4th Squadron of Uhlans went troops half left in order to charge us in flank, and they hurled themselves, when quite close to the farm of La Grange, against a third Squadron of the Empress's Dragoons. Finally the 5th Squadron of the 2nd Dragoons of the Guard galloped off to the front and on the left of the Uhlans, and in column of troops passed the farm, jumped a hedge, and formed line by wheeling to the right in order to charge the rear squadron of our Empress's Dragoons.

At this moment our 25 squadrons who were present had all been engaged, and some fresh reinforcements had arrived for the Germans. The 1st Squadron of the 4th Cuirassiers was formed in rear of the interval between the two leading squadrons of the 13th Uhlans. It threw itself in its turn on the left of the Empress's Dragoons, followed in echelon on the right by the 3rd Squadron, which remained in column. A portion of the Lancers of the Guard had, as we have seen, ridden through the 19th Dragoons. The two last troops of Cuirassiers had formed line by wheeling to the right, and taken them in flank; the remainder threw themselves into the *melée* going on between the 19th Dragoons and the 13th Uhlans.

The Hussars of Montaignu's Brigade at first had the advantage, in spite of the small height of their horses, over the 13th Dragoons and the squadron of the Guard (4th of the 2nd Dragoons), who were opposed to them. On the left the 7th Hussars outflanked the enemy's line, broke it up, and pursued it "at the point of the sword without meeting any great opposition." But the two fresh German regiments galloped up. The 19th Hussars, with its second Squadron, reinforced and prolonged to the right the five squadrons already engaged, and the 3rd and 4th Squadrons attacked the right flank of our Hussars and drove it back.

The right of the 16th Dragoons threw themselves partly into the *melée* of the Hussars, and partly against the 1st and 2nd Squadrons of the 3rd Dragoons, who had come to the rescue of Montaignu's Brigade. The centre joined in the bloody combat, which the right of the 19th Dragoons carried on against the two other squadrons of our 3rd Dragoons. The left also charged the strong groups of the Lancers of the Guard, who had ridden through the 19th Dragoons.

Thus the seven last German squadrons made their effort in several directions without any tactical plan, instead of making a concentrated attack, which was capable of great results. Both sides were engaged in small parties and with no guiding principle. Troops, as they arrived, went to assist those who were hard pressed. The confusion was great. Between the road from Jarry and the Yron nearly 6,000 troopers whirled about in thick dust in which could be seen sudden glints of arms and the flashes of rifles. Pistols, carbines, lances and swords did their bloody work, sometimes against friends as well as enemies. Everywhere were cries of rage, or of pain, of orders, or words of command. One occurrence brought about the solution, up till then uncertain. General France had sounded

the rally, perhaps in order to put an end to the mistake to which the Lancers of the Guard fell victims.

The confused mass of the combatants flowed back little by little to the north. Finally our troopers crossed the Fond de la Cuve, in order to rally on the plateau of the Grizières Farm. It was the tardy appearance of Clérembault's Division and the fire of the 2nd Chasseurs d'Afrique which stopped the enemy's pursuit. The *melée* which had begun almost simultaneously along the whole line a little after 6 p.m., had lasted about ten minutes.

It has often been suggested that the fire of our infantry on the right had helped to check the pursuit. But it seems to be proved on very reliable evidence, that the Battalion of the 64th, which was in position on the extreme right, had no idea of the cavalry fight although it was so close.

Meanwhile, Clérembault's Cavalry Division of the 3rd Corps, which had at first been between St. Marcel and the woods to the south, was obliged by the German Artillery to move to the west. From the plateau to the south-west of Bruville Clérembault soon saw the mass of our cavalry going back in disorder to Fond de la Cuve, and in his turn descended into the ravine level with the Grizières Farm, Maubranche's Brigade leading. Bruchard's Brigade went slowly in the same direction on the right of the Dragoons. Its movement was still more slow on account of the column of fugitives, amongst whom were the Lancers of the Guard, that it had nearly charged, taking them for Uhlans. A new proof of the inconvenience of having different sets of uniforms.

Clérembault's move, very feebly made, ended in a simple demonstration, which did not even permit of saving the waifs and strays of all sorts, who remained on the field of battle. A troop of the 2nd Dragoons formed line in extended order in the face of three or four Prussian squadrons who were rallying about 800 metres away. The 4th Dragoons, who were securing the right, received the order to advance. But Colonel Cornat had only two squadrons with him. He launched immediately the one on the right in extended order on the flank of the belated Prussian troopers. The other formed a rallying base for the Regiment.

This semblance of an attack hastened the retreat of the enemy. When the 4th Dragoons, who had all rallied, went forward, our opponents retired to the south at the same moment as the trumpets recalled our troopers on to the plateau.

The Germans had also sounded the rally when Clérembault's squadrons appeared. Rheinbaben's troopers rallied to the south-west of Ville-sur-Yron with the intention, the *Einzelschriften* assured us, of attacking the fresh cavalry which was seen in front of the wood at La Grange. But certain of their leaders did not think it right to impose fresh efforts on the horses, who had arrived at the limit of their endurance. On Rheinbaben's order all this cavalry slowly went back to Mars-la-Tour covered by the 13th Dragoons, who had been the first to be engaged.

This movement cannot be explained at all, coming as it did after a success, hardly contested though it had been. General von Voigts-Rhetz disapproved of it, and ordered Rheinbaben to go back to Ville-sur-Yron. The Commander of the 5th Division, who had already arrived to the west of Mars-la-Tour, answered that his horses were too tired, and that in addition there were some infantry on his right flank. He was not slow to retire as far as Puxieux, an incomprehensible move under the existing conditions. The Cavalry should not have abandoned the battle-field when the infantry on the German left had just undergone a severe check.

On our side Bruchard's Brigade went straightway to the west of the Fond de la Cuve without meeting any enemy. At 7 p.m. General France marched his squadrons to Gravelotte, where they rejoined Des Vaux's Division. Legrand's and du Barail's Divisions concentrated at 11 p.m. on the outskirts of Doncourt.

It was thus that the most remarkable of the cavalry combats which occurred during the war of 1870-71 terminated. Its material result was practically nil for the losses of both sides were about equal, except that we lost many more officers, doubtless at the moment of the retreat. The following is the list of these losses:—

German Losses.

	Officers.	Men.	Horses.
Staff of Barby's Brigade	2	—	—
1st and 3rd Squadrons 4th Cuirassiers	3	12	26
13th Uhlans (less the 3rd Squadron)	5	39	50
19th Dragoons	12	113	95
13th Dragoons	7	86	65
10th Hussars (less the 1st Squadron)	5	28	38
16th Dragoons	4	22	43
4th Squadron, 2nd Dragoons of the Guard	5	65	73
5th " " "	1	20	26
	44	385	416

French Losses.¹

	Officers.	Men.
Staff of Legrand's Division	6	—
Staff of Montagu's Brigade	2	—
2nd Hussars (less one squadron)	19	64
7th Hussars (less one squadron)	10	50
3rd Dragoons	12	59
Lancers of the Guard	16	125
The Empress's Dragoons (less one squadron)	10	58
2nd Chasseurs d'Afrique	5	51
	80	407

¹ Horses not specified.

In order to appreciate exactly the proportion of the losses amongst the officers it is as well to remember that the French cavalry possessed in 1870 much more numerous cadres than did the Germans: 7 officers per squadron instead of 5. It was the same with the staff of the regiment. Nevertheless, the total numbers of officers and troopers *hors de combat* were considerably more with us than the corresponding number with the Germans. This estimate goes to confirm what we have already said about our repulse.

The material effect of this imposing tourney on the general result of the 16th of August, is not very remarkable.

The turning movement, which Voigts-Rhetz had ordered Rheinbaben to make, was put a stop to, it is true, but it could not have been made after the check of the 38th Brigade.

The moral consequences of this cavalry combat, which was the most important of the war of 1870, were less than has often been stated. Without doubt the appearance at Mars-la-Tour of a strong force of German cavalry made the action of Ladmirault still more hesitating, but it was not the determining cause of his inaction at the end of the day. He relied on his reports as well as the fact that the commandant of the 4th Corps then restricted himself to maintaining his positions intact. It was the absence of Lorencez's Division, and not the great tourney of Ville-sur-Yron, which stopped the offensive of the 4th Corps.

In the course of this memorable fight an absence of control in the upper ranks, and of any idea of concentration, can be observed on both sides. Regiments engaged each other one by one, ours being generally very slow to move; the action crumbled away with slight profit, and the success of the Germans was little marked. Our troopers, like those of the enemy, could have been made much more use of: a great charge by all our cavalry would have annihilated the debris of the 38th Brigade, and the neighbouring Batteries; that is to say, the left of the German Artillery. And if the enemy had launched 27 squadrons in echelon against Cissey's Division in place of five, it must be conceded that the latter, surprised while in great disorder, would have been put to absolute rout. In a word, the fight would have fully re-established the German left.

A spirit of languor regulated our movements. Our absence of initiative from the Divisional General to the junior subaltern contributed to render our efforts useless, although, taking it all in all, our 25 squadrons were much better concentrated at the beginning than the 22 squadrons of the Prussians. We kept no reserve, so that the appearance of seven fresh squadrons on the side of our adversary made us decide to retreat. Finally, several times we started to charge when too far off with horses in bad condition, too heavily loaded, and whose breed did not permit always of such great efforts. Such were the numerous causes of our inferiority, in spite of the undeniable bravery of the troopers.

It must be added that three of our regiments were mounted on small horses, and very inferior in weight to those of the enemy. The 2nd and 7th Hussars, and the 2nd Chasseurs d'Afrique did not fight less courageously than the Dragoons and Uhlans. A new proof that *morale* is, after all, the ruling factor in war. The campaigns of the first empire are full of examples of this kind. How many times has it not been seen how our troopers, conscripts of the previous evening, badly mounted, hardly knowing how to use their weapons, overthrew splendid regiments much better mounted and drilled? But the Chasseur of Curély, or of de Brack, possessed the inborn idea of his superiority over every other cavalry soldier. Twenty years of war had given him the spirit and taste for the offensive above everything else. How we lost sight of these lessons in 1870!

(To be continued.)

They do not close lines of advance as fortresses on land frontiers do; nor are they situated or well situated as points d'appui for troops defending a coast-line against invasion, though this latter idea has sometimes obtained, as it mostly did with the Royal Commission of 1856, which reported on the defence of Portsmouth and Plymouth. Sebastopol did not stop the landing in the Crimea, and only retarded the attack of the Allies because they were not equipped for an advance inland. Port Arthur in no way hindered the invasion of Manchuria, and would have absorbed but little force had not sentimental reasons and mistaken ideas as to its strength influenced the Japanese. As long ago as Elizabethan days Sir Walter Raleigh stated that the only means to prevent hostile landings, which can be relied on by a country possessing an extensive sea frontier, is a Navy. And a few years ago even that ardent advocate of elaborate and costly works, the late General Brialmont, recognized that fortresses cannot keep a sea frontier intact for the water. "The principal guarantee against landings on a large scale will always be the timely intervention of mobile troops based on a place in rear of the centre of the sea frontier."

It may be argued that the defence of harbours does not contribute to coast defence, inasmuch as it denies to an invader the use of the harbours for disembarking and forming bases. And the fortification of certain ports has been recommended for this purpose alone, it being at the same time pointed out that a small armament would suffice, because as his armoured ships must be looking after those of the defender, which must be at a distance before a landing of any size could be attempted, the escort of the invader's transport could only be formed with ships unfit for battle. But the denial of a harbour would only entail a preliminary landing in its neighbourhood outside the range of the guns, and it would be manifestly impossible to give all

1. "Traité de la Défense des États et de la Fortification Permanente depuis l'Antiquité." Ed. 1856.

DEFENCE OF HARBOURS BY FORTIFICATION

By Brigadier-General R. F. JOHNSON, C.M.G., R.A.

CHAPTER I.

INTRODUCTION.

I.—*The Status of Defended Harbours in War.*

Defended harbours are, simply and solely, one of the means of carrying on naval warfare, and have nothing to do with the defence of sea frontiers, except in so far as they may serve as bases for the offensive action of a defending Navy.

They do not close lines of advance as fortresses on land frontiers do; nor are they suitable or well situated as *points d'appui* for troops defending a coast line against invasion, though this latter idea has sometimes obtained, as it notably did with the Royal Commission of 1859, which reported on the defences of Portsmouth and Plymouth. Sebastopol did not stop the landing in the Crimea, and only attracted the attack of the Allies because they were not equipped for an advance inland. Port Arthur in no way hindered the invasion of Manchuria, and would have absorbed but little force had not sentimental reasons and mistaken ideas as to its strength influenced the Japanese.

As long ago as Elizabethan days Sir Walter Raleigh stated that the only means to prevent hostile landings, which can be relied on by a country possessing an extensive sea frontier, is a Navy. And a few years ago even that ardent advocate of elaborate and costly works, the late General Brialmont, recognised that fortresses cannot keep a sea frontier intact; for he wrote:—"The principal guarantee against landings on a large scale will always be the timely intervention of mobile troops based on a place in rear of the centre of the sea frontier."¹

It may be argued that the defence of harbours does contribute to coast defence, inasmuch as it denies to an invader the use of the harbours for disembarking and forming bases. And the fortification of certain ports has been recommended for this purpose alone, it being at the same time pointed out that a small armament would suffice, because as his armoured ships must be looking after those of the defender, which must be at a distance before a landing of any size could be attempted, the escort of the invader's transport could only be formed with ships unfit for battle. But the denial of a harbour would only entail a preliminary landing in its neighbourhood outside the range of the guns, and it would be manifestly impossible to give all

¹ "Progrès de la Defense des Etats et de la Fortification Permanente depuis Vauban." Ed. 1898.

the small harbours suitable for an invader's purpose a garrison equal to withstanding the attack of the smallest force intended for invasion. If there were no possible landing place within many miles on each side of a harbour the matter might be entitled to consideration; but probably there is no such case in existence, and if there is, the coast defence force should generally be able to dispense with fortification, for the fire of the escorting ships cannot have much effect on troops.

The only examples of true coast defences that can be quoted are the martello towers placed at possible landing places round the shores of the United Kingdom in the early part of the last century. They served the political purpose of calming the popular mind, alarmed at the idea of invasion, and, as they might have caused a little delay, the then defective means of concentration on the part of the defence forces afforded better justification for their use than could now be found for anything of the kind.

Harbour Defence and Coast Defence are two totally different things. The latter, tactically offensive in its action, is concerned in resistance to invasion; the former, passive in its action, is one of means contributing to a nation's power to wage war beyond her coast line. Recognition of this fundamental truth is necessary for a correct appreciation of all points connected with the fortification of harbours, whether they be strategical or tactical, or matters of construction or organisation.

The only connection there can be between the two is the finding, as a matter of administrative convenience, by the fortress garrisons of detachments to guard vulnerable points on the coast, such as naval signal stations. This is not sufficient justification for a misleading nomenclature, which becomes absurd when applied to such fortresses as Gibraltar and Hong Kong.

Some countries place their harbour defences in the hands of their Navies, and eminent authorities have said that the British Navy should have charge of theirs.

As they are means of naval warfare, the idea is certainly logical; and it is quite conceivable that some economy might for a time result, because in such circumstances the Navy might think a floating defence of torpedo craft (including submarines) sufficient, although the countries who are considered logical do not seem to do so.

Sailors may be the best men to conduct the defence against ships and boats, but the defence against landed parties or larger attacks on the land fronts cannot be made entirely independent operations, and must be carried out by troops. The garrisons of British fortresses comprise many classes of troops, Regular and Territorial, European, Colonial, Asiatic, and of other races, and, while all classes have their idiosyncrasies which have to be known and humoured for the best to be got out of them, naval discipline in its details and application differs in many respects from military.

The suggestion has been made, as an additional reason, that, as a superior Navy will not require its harbours defended for long, it is desirable that the gunners of the fortifications should be available for service on its ships. The fact is overlooked that, however strong a Navy may be, its communications and bases can never be absolutely insured against attack, because complete blockade of any appreciable naval force is unattainable. Moreover, the art of gunnery with unstable platforms, such as ships which necessitate snap shooting with direct laying, is essentially different to that possible with the stable platforms of land batteries with all its advantages with regard to range-finding, observation of fire, the use of quadrant elevation, etc.

When the Navy has established its superiority there will be ample employment for any Regular Garrison Artillery that can be spared with the field army. There will be an ever-increasing demand for heavy batteries, and the siege companies will require much reinforcement. Then, too, the extensive use in the Manchurian war of hand grenades and light mortars indicates a share in the fight at close quarters, for which the Garrison Artillery is eminently suited, and of which it can relieve the infantry with advantage. Its natural rôle as a reserve for the Field Artillery is now to be taken in the British Service by special reservists; but in case of need it could still very well perform the duty, though unfortunately handicapped by the separation of the corps, which a correct appreciation of the conditions of warfare created by the possession of decided naval superiority might have prevented.

Some think that the Army would be benefited by being relieved from the obligation of maintaining the garrisons of defended harbours abroad. But the presence of the Regular troops is often wanted for other purposes than the defence of the harbours, and, as in war time they can sooner or later be relieved by second line forces, the garrisons really form a most valuable reserve of complete and fully trained units. The Army Estimates might be lessened, but probably this reserve would be lost without its being replaced by anything of equal value.

On the naval side it seems that there might be a danger of the responsibility for the continuous safety of their harbours causing some admirals to restrict their offensive activity. The possible personal equation can never be neglected in organisation for war.

Whether these views are right or wrong does not much matter, because the answer to the proposal is really based on a principle of war of general application: *all energies should be concentrated on what is most important.* This makes it sound policy for Continental nations, whose dependence for safeguarding their position is on their Armies, to leave all means of naval warfare in the hands of their Navies; but for an Empire depending for its existence almost entirely on its Navy, the same policy, however logical it may seem to superficial observation, would be radically bad, because it is incontestable that its

Navy should be relieved of any side issue in naval warfare which can be entrusted to its Army, so that the former may be able to concentrate the whole of its energies on gaining and keeping the "Command of the Sea."

This does not relieve the Navy of all responsibility with regard to harbour defence. If it selects harbours which cannot be made invulnerable by fortification, or if it agrees to an incomplete fortification, it is responsible for supplying the deficiencies in the defence against attacks by floating force from its own resources in ships, torpedo craft, mines, etc. If this responsibility is not acknowledged it is necessary for the Army to criticise the scale of defence allowed; but if it is, military criticism is not called for, and none will be found in these pages.

II.—*The Necessity for Harbour Defences.*

The necessity of giving harbours fixed defences has been the bone of contention of two rival schools. One asserts that if a country has a Navy sufficiently strong to assure its command of the sea, it has no need of any fortified ports, and that no number of them will lessen the number of ships required. The other maintains that naval warfare cannot be carried on without fortified bases and posts on the lines of communication, and that the possession of them, if they are properly selected and armed, may make fewer ships sufficient. This, of course, is a very rough statement of the extreme views of the two parties.

If no modifications were possible, those of the first, the Blue-water School, would have to be accepted, because they are largely founded on history, and the arguments for them have been rather strengthened than not by modern alterations in the conditions of locomotion and armament. The utility of history, however, depends on its correct interpretation and application, and we believe that defended ports can be shown to be indispensable to a Navy, whatever its strength may be, although their possession in no way affects the number of ships required. As Captain Mahan says in his little book, "Lessons of the War with Spain": "coast defences and naval force are not interchangeable things, neither are they opponents, one of the other, but complementary. The one is stationary, the other mobile; and however perfect in itself either may be, the other is necessary to its completeness."

The duty of a Navy is to gain, or if inferior to dispute, the "command of the sea," which consists in having the power to keep the sea clear of hostile ships in order to (1) prevent attacks on its own territory; (2) secure the communications of its own commerce; (3) destroy its enemy's sea-borne trade; and (4) make possible assaults on hostile territory.

The late Rear-Admiral P. H. Colomb, in his valuable book, "Naval Warfare," shows that before our first war with the Dutch, which commenced in 1652, the sea had been regarded as a general highway, open to each belligerent, the efforts of whom were confined to warding off attacks on territory at the

time of their attempted execution, and in making reprisals of the same nature—a form of warfare he terms “cross-raiding.”

In 1652 the idea of injuring an enemy's means of carrying on war by stopping his sea-borne trade, while protecting one's own, came to the front, and “we had an excellent example of the struggle for the command of the sea, carried on between two maritime Powers of not very unequal naval force, but one of which (Holland) appeared to be much weaker on the sea because of her great dependence on sea-borne commerce and the necessity she was under of protecting it.”¹

In the second war (1665) the Dutch considered the beating of our fighting ships of such primary importance that they abandoned the defence of their commerce, and actually decreed that it should be entirely suspended so as to prevent our profit by captures. We, having disposed of their armed ships for a time, in 1666 destroyed two hundred of their merchantmen in the undefended port of the Vlie. But a year later we neglected to maintain the efficiency of our fleet and put our trust in inefficient harbour defences, with the consequence that the Dutch raided Harwich and Sheerness, and did much damage to our shipping in the Medway.

Of the lessons of these wars with Holland, Admiral Colomb remarks: “And what so far was this kind of war? It was doubtless chiefly a series of general actions between the most powerful forces that each side could bring to bear against the other. Secondly, it was the attack and defence of commerce at sea. Thirdly, it was the attack and defence of commerce in port, supplemented here and there by attempts to damage the sources of naval strength, and to a very small extent by attempts to damage property on land. . . . It had also fully demonstrated that it was entirely hopeless to think of making attacks on shipping in port, on sources of war supply, or on property on land, unless there were at least an assured local command of the sea surrounding the point attacked.”²

According to a definition once given in some correspondence in *The Times*, “the command in certain waters exists when within these waters no hostile fleet can count on the time requisite for a serious enterprise without a strong probability of having a superior force to deal with.” This supplies a modification of Admiral Colomb's sweeping deduction, in that it implies that minor enterprises are possible without an assured local command, which possibility seems to be proved by some of the historical examples shortly to be given.

But supposing assured command to be indispensable, although there may be considerable disparity of force between the two combatants, the stronger cannot guarantee that the weaker shall not have such command anywhere until all the fighting ships of the latter have either been destroyed, captured, or driven off the seas; and the chances of denying local com-

¹ “Naval Warfare,” p. 44.

² *Ibid.*, p. 81.

mand must decrease as dispersion over the world of an Empire's possession widens. Moreover, responsible sailors will acknowledge that a complete guarantee cannot be given because the destruction or capture of the whole of an enemy's naval force is too much to expect, and history shows that blockade, the difficulties of which have not been lessened by modern conditions, has never been made absolutely certain.

To give up concentration of force, by which alone, in the first instance, anything approaching command of the sea can be attained, is, of course, an error in policy and strategy; but the chances local command gives of apparent success to an inferior Navy are undoubtedly a great temptation to minds untrained in the problems of maritime warfare, and we find it has often influenced Continental nations. Even when in 1779-82 our English Navy was the weaker, the different interests of the Spaniards and the French, and the desire of the latter to at the same time succour the Americans and strengthen their hold on India, caused a dispersion of their force. We unfortunately were for various reasons unable to profit by this neglect of a principle of war; but in 1796-97, though still the weaker, we were able to maintain a state of concentration, and the mistakes of the allies gave us the victories of St. Vincent and Camperdown, and a position of superiority that has since been scarcely questioned.

The extreme opponents of fortification assert that over-sea attacks on territory cannot be carried out at all as long as the defence has any naval force, which may possibly interrupt the lines of communication. Their doctrine is commonly known as that of the "fleet in being." However well-founded the idea may be as regards large expeditions, such as the invasion of a country, which take considerable time for their execution, and depend during it on sea communications, it is not, as we have just said, historically supported as regards small enterprises, such as attacks on harbours, requiring little time, whose supplies can be carried in the transports. Nor can it apply to large undertakings, when sea communications are not necessary after the expeditionary force has been landed. Indeed, it is conceivable, as has been noted by Captain Mahan in his "Life of Nelson," that it might be worth the while of a combatant, with inferior naval strength but with very superior land forces, to throw a considerable body of troops on to his adversary's territory with the deliberate intention of sacrificing it, for the sake of the mischief it might accomplish and the prestige with possible allies it might gain before it could be forced to surrender. In such a case a harbour containing elements of naval strength would be the natural objective.

The term "fleet in being" first occurred in Lord Torrington's explanation of his not risking a decisive action in 1690, and the existence of his crippled fleet is held by his disciples to have prevented a French invasion of England at the time. It cannot be doubted that any latent power to dispute the command of the sea must have a deterrent effect on operations which require it, and certainly not a few instances may be quoted from

history, beside the situation after the indecisive battle of Beachy Head, to support the doctrine as a rule of war. On the other hand, the fact that certain things were not done in certain circumstances is not proof that those circumstances were the deterring cause, and the following examples show that doubters of this doctrine have some ground for their attitude.

The French landed six thousand men in Bantry Bay in 1689 while an English squadron was within sight.

We captured Gibraltar in 1704, although the French in the Mediterranean were strong enough and near enough to fight the indecisive battle off Malaga shortly afterwards.

In 1705 Barcelona fell to the Earl of Peterborough, whose troops were assisted by a strong force of marines and seamen landed from Sir Cloudesley Shovel's ships, in spite of there being an unblockaded French fleet at Toulon.

Admiral Vernon in 1741 landed troops to attack Santiago, notwithstanding the presence of a Spanish squadron at Havana.

In 1756 the Duc de Richelieu landed 15,000 men in Minorca, when there was no certainty that his covering fleet would not be defeated by Admiral Byng.

Admiral Barrington disembarked troops for the attack of the forts on the island of St. Lucia on the 13th December, 1778. He had sufficient supplies in the transports, and having anchored his fighting ships across the entrance to the bay of the Grand Cul de Sac, he supported them with batteries constructed on shore. On the 15th Count d'Estaing appeared with a superior naval force, but could only cannonade the British ships ineffectually. On the 17th he actually landed troops in the immediate neighbourhood, but he withdrew them on the 30th, and the forts surrendered on the following day.

Next year Count d'Estaing retaliated by seizing Grenada. Admiral Byron arrived on the scene just after the re-embarkation of the expeditionary force, but although he was strong enough to offer battle at sea, he could not attack the French ships while they could be assisted by the lately captured land forts.

Suffren took Trincomalee in 1782, in spite of having to expect the naval action with Hughes, which came off three days after the place surrendered. Of this exploit of a man not afraid of a fleet in being, Admiral Colomb remarks: "The capture of Trincomalee by Suffren was a most admirable illustration of what can be done in the successful attack on territory from the sea, if the time limit is thoroughly understood and properly calculated; while on the other hand, the exceeding narrowness of the limit shown is a warning as to the risks run under such conditions."

The siege of Calvi was undertaken in 1794, while a French fleet was in being at Toulon.

In 1795 there was no doubt of our having a decided command of the Mediterranean, but Nelson was apprehensive of a

¹"Naval Warfare," p. 377.

French attempt to transport a force by sea to attack the Austrian communications in Italy.

Again, it is clear that Nelson did not consider a descent on the English coast beyond the range of possibility in 1801, for he issued a proclamation stating that the services of the "Sea Fensibles," a special corps of naval volunteers, were urgently required on the coast-defence flotilla.

As regards Nelson's views of the doctrine, Captain Mahan has said: "It is clear that Nelson in his day did not attach absolute deterrent effect to a fleet in being, even to such a one as the British then had in the Mediterranean. Important factor as it was, it might conceivably be disregarded by a leader who recognised that the end in view justified the risk." Again he remarks "that the deterrent effect of an inferior fleet in being 'lies less in the nature of things than in the character of the officer on whom it is produced.'"

Perhaps the most striking instance of the ineffectiveness of an inferior squadron in preventing an attack on a defended port after troops have been landed is afforded by the French capture of St. Kitts in 1782, for there Lord Hood, by skilful and bold manœuvre, actually placed his twenty-two ships between de Grasse's fleet and the land, but could not stop the action of the French troops, because they had sufficient supplies to last for the time taken in reducing the fortifications. There is, as already noticed, a difference between a small expedition and an invasion, and this example may be called exceptional; "still, the difference and the exception may be held to show that it is impossible to lay down an absolute rule . . . every case must be considered with reference to its own peculiar conditions."

There are risks for the assailant, and the risks are great if the defender possesses any naval force; but the fact remains that with the infinite variety of conditions in war no harbour can be said to be entirely free from liability to attack as long as the enemy has any force afloat whatever may be the relative naval strength of the combatants.

Whether an attack will be made or not depends on the opportunity of the moment, and on the value to be gained in the shape of profit to the assailant or damage to the defender. The value in the case of commercial harbours will consist in the effect of damage to trade and property on the national will to carry on the war; but in the case of naval bases, anchorages, and coaling stations, it is a matter affecting the power to carry on the war, and the profit must be discounted by the loss in the event of failure.

As fortification on an adequate scale undoubtedly increases the force and time required, it lessens the opportunity for attack.

¹ "Life of Nelson," Vol. I., p. 196.

² 1795-96.

³ *Idem*, p. 198.

⁴ "From Howard to Nelson," p. 384.

and it would seem that fortified harbours play the same part in sea warfare as fortified bases and posts on lines of communication do on land, and that they are equally necessary to enable concentration of force for decisive battle.

"But," we may be told, "the garrisons in land war can patrol the communications, whereas they can take no part in keeping them open by sea; and bases and harbours cease to be of use when the communications are closed. The forts only hold the area within gunshot, and cannot, as they do in land warfare, with its more circumscribed field of action and slower motion, afford assistance to the mobile force by protecting its flanks or by limiting the area of operations." In support of this view, Rear-Admiral P. H. Colomb has used¹ two illustrations, which may be shortly stated as follows:—

A fleet is engaged in blockading a port. A squadron of the enemy appears off its base and interrupts the communications. The blockade has now to be suspended until the communications have been reopened. Now, if the base were undefended it might be destroyed, but if defended, the reopening of the communications might be deferred until convenient, or possibly left to another force called from a distance.

A squadron fills up at a coaling station, exhausting the stock, and departs on its business. During its absence ships of the enemy close the communications and prevent any replenishing. On its return the coaling station will be useless. But this would not happen if the stock of coal had not been exhausted. Supposing it were not, and the harbour were undefended, then a very small force might render the station useless.

Again, it is urged that not only can forts do nothing towards keeping communications open, but that the amount of injury they can inflict on an enemy's ships depends entirely on the amount of opportunity the ships give them, because the ranges and the angles of incidence of the projectiles are decided by the ships, whereas a naval force assigned to the defence can protect a harbour as efficaciously as forts, and can control the conditions of the combat as well as the attackers; and, moreover, can patrol the communications for a considerable distance. The answer to this is, that to assign any of the floating force to a fixed locality weakens it in the struggle to gain or dispute the command of the sea, which is contrary to a fundamental principle.

The idea that ships which have become somewhat obsolete in construction, speed, or armament can be used for harbour defence is quite a mistaken one. The ships gain no advantage by being on the defensive, and if the crews are not to be uselessly sacrificed they must have equality of power with their assailants. Besides, the defending ships, even if the victors, would undoubtedly suffer almost as much in efficiency as the attacking, and the harbour would consequently be undefended for some

¹ "Essays on Naval Defence," 1893.

time after any action, unless a further detachment were sent to it from the available naval force. On the other hand, fortifications are much less vulnerable, can effect their purpose with lighter armament, as will be shown later, and are in all respects cheaper and more lasting. The errors the idea leads to have been exemplified by the American coast-defence "monitors," though these were designed in the first instance for attack, and are so well known and fully acknowledged that they need not be dwelt on.

Fortified bases have from time to time failed in their object, or have even exercised a retarding influence on naval strategy. Probably our fleet might have been given employment of more immediate profit than was possible when the relief of Gibraltar absorbed a large portion of its energies, and to get full value from the example it has been pointed out that Nelson, when he was watching Toulon, preferred to use the undefended roadstead of Maddalena. Gibraltar was too distant, and in those days was so little equipped as a base as not to be even able to supply ships with water. It was only a defended anchorage, though one of great value owing to its position between the Atlantic and Mediterranean divisions of the French and Spanish fleets.

Port Arthur, too, has been proclaimed a failure, and has had ascribed to it a fatal influence on the strategy of the Russians. But if it had been a suitable harbour for a fleet, if it had been properly prepared for war, and if Rodjestvensky had arrived earlier — all three perfectly fair postulates — the verdict might have been very different. The fact that an instrument is not suited to every operation, or has been sometimes badly made, or badly used, is no ground for condemning it as always useless.

The mention of Port Arthur suggests that a fortified harbour may help an inferior Navy by protecting a weak detachment until relief arrives. It failed, but Fort Royal, Martinique, in 1780, when Rodney had twenty-one or twenty-two ships in the neighbourhood, sheltered five French ships until the arrival of De Grasse with twenty-one caused the transfer of the command in those seas. Probably other similar instances could be found in the history of the West Indies.

The protection of her fortified bases has undoubtedly in more than one war enabled France to dispute our command, and compelled us to use more force than would have been the case if they had not existed, while it is probable that, if Napoleon had left his fighting fleet under the cover of Toulon, Nelson would have been tied to its vicinity, and the communications of the Army in Egypt, though perhaps precarious, would not have been completely severed.

The necessity of fortified bases to an inferior naval Power can, indeed, scarcely be contested, and for the reasons given they are of assistance to a superior Navy in that (1) they relieve it to some extent of operations, which in their absence would divert part of its energies from the vital issue, and so (2) give

freedom to its movements of appreciable value though it may be limited and never complete.

Can the fortification of harbours assist in the secondary operations of sea warfare—the attack and defence of commerce?

The possession of defended posts, however numerous, does not constitute the command of the area they are dotted over, either on sea or land. Our naval wars in the West Indies and our campaigns in South Africa prove that conclusively. But the defence of a mercantile marine consists in making its routes safe, and is really a matter in the nature of policing. It can scarcely be denied that this must be facilitated if the intervals between the defended posts are small. Even almost complete command of the sea will not ensure immunity against the capture of merchant shipping, as the Germans proved off the coast of France in 1870.

On the other hand, defended posts can assist an inferior Navy in its efforts to interfere with the sea-borne trade of its adversary, which will probably be larger and more vulnerable than its own, by serving as points whence attacks can be made when the policing cruisers are absent, or by attracting superior force to observe the commerce destroyers they shelter, which may create opportunity for mischief elsewhere.

Although the over-sea trade of some nations who might be involved in maritime war is too small for damage to it to be much felt, and although injury to such as the British Empire's is not likely to be so great as to have any immediate effect on the conduct of a war, still the channels of trade are so hard to restore if once diverted, that nothing is wasted which tends to give confidence to one's own people, or to neutrals, in one's power to afford them effective protection.

Therefore, fortified commercial harbours are of value, whether a nation is strong or weak in naval force, and even in the case of a country which has very little ocean trade it may be desirable to fortify its principal ports to prevent violation of its neutrality.

Both for fighting and trading purposes, then, nations require an equipment of a certain number of defended harbours; but as the assistance they give to the floating force is limited, their number and the scale of fortification must, though the comparative cost of ships and forts in no way affects the matter, be strictly confined to what is indispensable in view of the national position in naval warfare.

III.—*Method of Discussion.*

There have been but few cases of fortified harbours being captured or reduced to subjection by naval force alone, and in most of these the ships have had to land part of their crews to complete the work, or there have been troops at hand to occupy the evacuated forts. Moreover, the conditions have been such as cannot now be taken into account in enunciating principles of action.

Sir George Rooke attacked Gibraltar in 1704 with twenty-two of his ships, but to complete the capture, marines had to be landed, and the garrison only numbered between eighty and one hundred and fifty men.

In 1739 Admiral Vernon overwhelmed at close range the works on one side of the harbour of Porto Bello, and the garrison surrendered, but apparently with no good excuse.

To the same admiral the town of Chargres in 1740 succumbed after a simple bombardment of three days.

In 1748 Port Louis, Hispaniola, surrendered to Rear-Admiral Knowles, who had served with Vernon. He took in to within pistol shot ships with a broadside of 257 guns.

Lord Exmouth in 1816 reduced Algiers to submission by the destruction of its sea defences, which placed the whole town at his mercy. The ships at very close range poured in no less than 49,000 rounds of shot, and 966 thirteen- and ten-inch shells from bomb vessels.

The Egyptians evacuated Acre in 1840 after an afternoon's bombardment, during which they had found that they could inflict no material damage on the ships. There was a Turkish land force ready to occupy the place.

During the American Civil War the Federals successfully silenced works at Port Royal and Hatteras, but in both cases the forts were imperfect and their gun power nothing like that of the ships. Troops were waiting close by to take possession.

We silenced the seaward defences and were able to land men at Alexandria in 1882 but certainly should not have done the latter and perhaps not the former if the works and garrison had been efficient.

If there is a rule of war more certain than others it is that for successful attack on a fortified harbour, with a view to its capture or to the destruction of its contents, the force employed must include troops, and the part played by the ships should be restricted to helping them. If anyone is inclined to question this, let him study the history of Charleston, South Carolina. In 1776 and in 1863 ships acting alone failed against it, while in 1780 and in 1864 troops supported by ships succeeded.

We see, then, that harbours require defences on their land fronts as well as seaward.

Now, there is so much difference in the conduct of the land and sea defence and in the nature of the fortification required that the subject is naturally divided into two parts.

The land defence is a matter of infantry tactics, and, as will be explained later on, the works need seldom have the permanent nature that is necessary for the sea defence, which again is a matter of artillery tactics.

The works on sea fronts must be permanent on account of the weight of the heavy guns and mountings necessitating deeply-seated foundations for the emplacements, and because firmly fixed mountings are required for the development of the accuracy and rapidity of fire possible with the light and medium

guns, as such mountings alone admit of sufficient speed in traversing and the use of auto-sights.

Apparently the use of heavy howitzers by the Japanese at Port Arthur and our interesting experiments in South Africa in mounting 9.2 and 6-inch guns on railway carriages have led some who have little acquaintance with fortress work to imagine that seaward defences can be improvised; and a story has been told of a suggestion being seriously made that a 9.2-inch Mark X. gun should be temporarily placed on the shore at a certain Colonial port to meet what was thought to be an emergency. It may not be waste of time, therefore, to make a few short remarks on these misunderstood examples.

The placing in battery of their 11-inch howitzers took the Japanese a far longer time than could ever be counted on for arming batteries between the threat of war and the possible arrival of hostile ships. The recoil of guns firing the same weight of projectile with effective velocity renders their improvised mounting quite impossible, while the results obtained with the howitzers against anchored ships at Port Arthur makes their value for defence purposes very doubtful, though they might, *faute de mieux*, be used to give a show of defence to an improvised naval base. The older patterns of 9.2- and 6-inch guns can, as they were in South Africa, be mounted on railway trucks, but they are not sufficiently powerful to deal with armoured ships; their arcs of fire and rates of fire are much too small, and to get them into position they would require special railway lines, which in most cases it would be quite impossible to construct.

The discussion of the attack on sea fronts can be conveniently divided with reference to the different classes of vessels that may be employed, because, although they may often be employed together, the action of each is very different. That, too, on the conduct of the defence can be best dealt with under the heads of heavy, light, and medium guns.

Consequently, Chapter II. deals with the attack by (1) fighting ships; (2) torpedo craft; (3) other vessels. Chapter III. investigates the armament required to meet (1) armoured ships; (2) torpedo craft; (3) other vessels. Chapter IV., under the heading of artillery tactics, as that is the chief arm concerned, discusses the conduct of the defence, under the sub-heads (1) heavy guns; (2) light guns; (3) medium guns; (4) adjuncts. Chapter V. takes up the attack and defence of the land fronts; and Chapter VI. considers the conduct of the land fronts defence under the heading of infantry tactics, as in this the other arms are only auxiliary. In Chapter VII. a few important points connected with the organisation of garrisons have been noted.

If any of the arguments appear to criticise existing regulations, the writer's excuse is that although all regulations must be strictly observed, acceptance of them as unquestionable would prevent an intelligent application of their spirit, and constitute a bar to progress.

(To be continued.)

THE IMPORTANCE OF FIGHTING DISMOUNTED FOR CAVALRY, AND THE PLACE TO BE ASSIGNED TO IT IN ACTION AND INSTRUCTION.

By Major IMMANUEL, Infantry Regiment, No. 158.

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THE discussion on the subject of the importance to be accorded by cavalry to the *arme blanche* and the *fire-arm* is far from being at an end; each weapon has its advocates, who claim with an equal amount of energy preference for their favourite. The one side is unwilling to admit that fighting dismounted has acquired any greater importance than formerly, and absolutely denies that it may be necessary to have recourse to it, if cavalry is to maintain itself at the same level of efficiency as the other arms. The true reason for this opposition is the fear of seeing too much time devoted to dismounted instruction, without which the employment of cavalry in fire-combat can never give good results, to the detriment of mounted drill. The holders of this view only see in fire-combat an expedient, a last effort, which ought not to be resorted to except in extreme cases, for in their eyes to resort to this method of fighting is in truth degrading to the proud cavalry arm, the pure and true spirit of which suffers from the moment that it quits its legitimate path for one contrary to its true nature.

The opposite opinion is quite as frank, quite as categorical. We know that there exists, as a matter of fact, a strong idea—outside the cavalry, be it understood—according to which cavalry can no longer appear on the battle-field, and must confine itself to the work of scouting.

The champions of this view contend that every charge of cavalry against even half-broken infantry would infallibly fail in presence of the accuracy and rapidity of modern rifle fire; they even assert that the effect of such a charge would be null, even when the cavalry should have traversed, with more or less heavy losses, the line of the enemy's sharpshooters, a loose and almost invulnerable formation. The chances of success of a charge of cavalry against artillery are scarcely better, because the quick-firing guns will discharge a veritable hail of shrapnel, which, as the distance decreases, would be absolutely annihilating, and if by chance some few riders escape this hurricane of lead, they will pass at the charge through the line of shield-protected guns, without being able to do the least harm to the men serving them. In short, the

protagonists of this school consider great cavalry charges as useless, without object. Other military men, who are of a similar opinion, but whose views are formulated not quite so dogmatically, only see—although they do not frankly say so—in modern cavalry a mounted infantry; that is to say, an infantry which is in a position to move itself rapidly to the spot where it can most usefully intervene with its fire.

The alleged lessons of the South African war, and of the gigantic struggle waged in Manchuria, have been the reason why, in different quarters, it has been assumed that the day of cavalry is over; that this arm, as such, belongs to the past.

We will not go into the arguments which superficial observers have brought forward in support of their views. It will suffice for us to briefly recall the absolutely abnormal conditions under which the Anglo-Boer war was waged, where the English cavalry was, in effect, equally powerless against the Boer trenches and their mobile and numerous commandos. In Asia, the Japanese only disposed of a very weak cavalry, while that of the Russians was not at all prepared, either for its proper rôle or for the various duties which fell upon it. It is evident that from these two great wars a number of lessons and new ideas may be drawn, principally for cavalry, and we insist on this point, because nearly as valuable lessons are to be learnt from the negative as from the positive results of a campaign.

But what are the lessons to be learnt from these two campaigns by the cavalry?

Why, above everything, before all, that cavalry has not become superfluous; has not retrograded; and that it ought not to abandon its proper rôle.

It remains, as formerly, the eye of the army, to employ an old and much used, but very true, formula. If it discharges its rôle of scouting efficiently, the commander-in-chief should be informed with sufficient detail and accuracy of what the enemy is doing, early enough to enable him to gauge the situation correctly, and to make such disposition of his forces as will enable him to overthrow the enemy. Only that leader who shall clearly see through the designs of his opponent, will be able to forestall him in resolve and action, and force his own will upon him. That is the great problem for the commander-in-chief and his principal leaders. It is, in truth, the penetration, decision, and daring of the general-in-chief that, as Moltke so well puts it, "will pierce the veil of uncertainty which envelops the situation; will make him appreciate exactly the value of what he has learnt; divine what he has not been able to learn; make him arrive rapidly at a decision, and then carry it out with energy and without hesitation." It is therefore clearly necessary for the commander-in-chief to be furnished with trustworthy information in order to enable him to form a sound judgment as to what the enemy is doing, and this information can only be furnished him by a strong cavalry,

well directed, and absolutely competent to carry through the various duties which fall upon it. This is a fact which cannot be disputed, and will hold good as long as we have wars. The cavalry drives off that of the enemy, opening thus the way for the scouting parties, as well as to the various units which follow, and leaving it free to investigate and fathom the enemy's dispositions.

But the rôle of cavalry is not limited to long distance scouting, and to scouting only; it extends to the field of battle itself. A good deal is heard in these days of the "Void of the field of battle"; this phenomenon, due to the careful use of ground by infantry and artillery, both in the attack and in the defence. But the more careful these arms are to shelter themselves from the sight and blows of the enemy, the more does tactical scouting become necessary. And by tactical scouting we mean scouting close up to the enemy, which should be carried out both before and during battle, should pass round the enemy's wings, and never for a moment lose close touch with him. To this must be added the necessity of protecting the flanks on the field of battle against attacks by the enemy, of driving back his scouting parties, and of detecting in good time enveloping movements. In short, cavalry must operate in close and intimate correlation with its sister-arms; it ought to intervene actively in the action, whether by charging—if there is no other way of achieving any result—or by fire-combat, either alone or reinforcing the fire from the horse or machine gun batteries attached to it.

After the battle, cavalry should find the opportunity of reaping laurels, even in presence of the weapons of to-day. If it knows how to seize the right moment for acting; if it moves with the necessary rapidity; if it is independent and daring, cavalry will always find itself in a situation to take the largest share in the pursuit, with the assistance, if possible, of artillery and machine guns. The weighty words of the training regulations for the German cavalry (Pars. 376-378), have lost nothing of their importance, nothing of their appropriateness; on the contrary, they have acquired a still greater importance, owing to the conditions of modern warfare. It seems well, then, to give, *in extenso*, the words of the regulations in question:—

"The leader of every cavalry unit, even if this unit is only momentarily independent, should, on his own personal responsibility, take all the measures necessary for discovering the enemy in retreat and pursuing him hotly.

"But much better than following on the heels of an enemy who is falling back, is it to outstrip him and, supported by the artillery, attack him in flank, either sword in hand or by fire, in such a way as to intercept his retreat, and throw his columns and convoys into disorder and confusion.

"Such pursuit ought to be undertaken by the whole cavalry and continued without rest or repose, and without consideration

for the men; even with the horses fatigued, it ought to be continued night and day.

"Every horseman of the victorious army ought to endeavour to outstrip the enemy in retreat, and every commander of troops must exert himself to this end. After victory the mass of the army can dispense with cavalry. A pursuit pushed relentlessly home may save the army a new battle, and sometimes bring the whole campaign to an end.

"The pursuit at all cost is then a duty which must be impressed on the cavalry, all the more as the difficulties which have to be surmounted (fatigue, exhaustion of the troops, dispersion of the enemy) are never really experienced in peace manoeuvres."

It is necessary to bear well in mind that the fighting of modern infantry, which may go on for days and nights, using up all their energies, shattering their nerves, will create the greatest disorder in the ranks of the beaten, while the victorious infantry will also be exhausted and often not in a condition to continue the action or even make a forward movement.

The task of the cavalry will be all the more decisive and richer in results, and its chances of success will lie above everything in the rapidity of its movements and the energy of its action. Hurrying continuously forward, it will overthrow by a vigorous charge the enemy's cavalry and will thus open the road towards his line of retreat. At a favourable spot, preferably on the flank, it will deploy a line of skirmishers and open a destructive fire on the retreating columns, with the powerful support of its horse artillery and machine guns.

If the enemy shows himself still sufficiently strong to make success doubtful, the rapidity of movement of the cavalry allows of its rapidly breaking off the action, retreating again to a distance and then renewing the attack at another spot, under better conditions. If it thus wears down the enemy, giving him no rest, it reaps the success for which the deadly struggle of the other arms on the battle-field itself has prepared the way. If we take the Russo-Japanese war, where the success obtained by the cavalry was so small, we will ask what would have happened after the battle of Mukden, if the mounted troops had played their proper rôle? For fourteen days the opposing armies had struggled, up to the point of exhaustion.

The Russians, finally beaten, fell back towards the north, under the most unfavourable strategical and tactical conditions; that is to say, enveloped on both flanks, only able to use a few roads, with the disorder, discouragement, and trouble constantly increasing in the columns, the tactical links of which had been much loosened in the course of the action. The Japanese infantry, itself extremely fatigued, was not in a condition, with the best will in the world, to overcome the need for repose, and pursue them. If, in place of the sixty widely dispersed Japanese squadrons there had been two or three divisions of cavalry in close order in hand, they would have advanced rapidly by the plain to the west of the Mukden-Tieling route, getting ahead of

the masses of the enemy, and would thus have been in a position to have inflicted on them very serious damage, and might even have brought them to the point of almost complete disaster. The issue of the whole campaign depended on this moment! The situation was not taken advantage of by the Japanese, because they had not the requisite cavalry at their disposal, and therein is a valuable lesson for the future.

But the tactical rôle of cavalry does not cease here. Cavalry which has been pushed forward, if it makes adroit use of close country, should be able to hamper the march of the enemy's advance guard, and thus give to the troops they are covering the time necessary, which is so important in these days, to effect their deployment.

They can appear on the flank of the enemy's approaching column, and take obliquely the column of march of his artillery with their fire, thus gravely delaying the enemy, which will be of great advantage to their own commander-in-chief.

But what, then, are the essential qualities for cavalry, if they are to be equal to carrying out the complex and important duties, which fall to them, fraught as these may be with the gravest consequences? It demands from all their leaders—and we include here non-commissioned officers—the greatest skill in scouting, a knowledge of how to transmit reports, even for privates, then certain technical aptitudes (the use of the telegraph, signalling, work of destruction, the construction of bridges, swimming, etc.), to be skilled swordsmen; to be able to take a horse across any country and over any obstacles; to be masters of horsemanship; and, finally, last but not least in importance, good marksmen.

The training of each individual man takes the first place; his instruction in all the duties of a cavalry-man is fundamental, because the whole body will not be effective unless each of its constituent elements is complete master of his work. But the first condition of success is the "Cavalry Spirit," the sterling, thorough, vigorous, happy, cavalry spirit, which is the result of *savoir-faire*, the military instruction and education received, confidence in its own possibilities, and the determination to dare great deeds. Without this spirit, cavalry will perform nothing. It is essential, then, that it should be developed, cultivated, and sedulously maintained. It must not be stunted by petty considerations, by the disappearance of the distinction between cavalry and mounted infantry. It is certain—we admit, with certain reservations—that in war there will be more occasions where cavalry, well posted, will seize the carbine in order to co-operate in the fighting, than there will be cases where it will fling itself at the charge on the lines of infantry or artillery, which are hurling forth fire and death. But it will, nevertheless, do that, and it will not hesitate for an instant to do it, if it is necessary, if the situation requires it, and for this the cavalry spirit, the first, finest, and noblest quality of the horseman, is necessary. But

in addition, cavalry must be thoroughly trained in the use of their rifles, and must know how to fight a fire-combat, because it may well happen that this form of action is the best, and the occasion for it will often arise, and the effect be decisive. So—and we again insist on this point—much as we extol the cavalry spirit, and the special characteristics of cavalry, do we also attach importance to training in fighting dismounted. It has become in these days an indispensable branch of instruction, because upon it depends the possibility of using cavalry under the varied conditions of war which will be unavoidable in the future. And this complexity in employment is characteristic far more of the cavalry than of the other arms—a splendid, weighty, but highly honourable duty. It is this which constitutes the distinguishing mark of modern cavalry, and it is in this that the value of this arm resides.

The firing regulations for the German cavalry, published in September, 1906, constitutes an excellent guide for the training and instruction of cavalry in fire-combat. A great deal is required from cavalry in this connection, and almost as much is expected from them as is obtained from infantry. We must naturally bear in mind that the defensive action and the fire-action by itself, that is to say, in short, firing at the right range against the enemy, constitutes the main point here, because it is not probable that the attack will be resorted to often by cavalry. It goes without saying, however, that cavalry must be exercised in attack as well; but the main point will be always, in short, the firing itself, the movement forward by rushes or otherwise taking only second place.

Firing instruction rests, above everything, on continuous, thorough training, directed, above all, to the individuality of each man. The preliminary drills and the schools of musketry, where men must be brought up to comply with the conditions imposed, are valuable in this connection. An intelligent, level-headed staff of instructors is necessary, if the best results are to be obtained, thoroughly trained and specially conversant in all relating to musketry. A day should not pass without the man taking his carbine, if only for a few minutes, and practising himself in aiming. The whole operation of aiming, even such details, trifling as they may seem, as where to place the right hand on the stock, the handling of the trigger, etc., must be repeated again and again, without losing patience or neglecting the slightest detail. It is not enough that the man should come up to a certain standard, and come up to it quickly. Nothing is worse than when all that is thought about is to rush the men through the different classes, so as to make them finish with the school of musketry as rapidly as possible. If men look upon this important branch of the service as only an irksome accessory, to be hurried over, there will be no real musketry instruction. In reality, men trained in this way will be out of slight value, and disappoint not only themselves but the body of which they form a part. Under no pretext can a superficial course of instruction be tolerated.

It is clear that, as with the infantry, the point to be aimed at is the training each individual man to be a skilled marksman. But the musketry school only constitutes a preliminary to battle firing, and in this the eye must be trained to detect rapidly small objects on the ground, up to as much as 1,200 metres, and to aim correctly at these distances, even when the objects are on the move; it is necessary, moreover, for the man to know how to judge distances and adjust his sights accurately, and to make judicious use of cover.

After the men have been thoroughly trained individually in all these details, they must be taught to work in groups. Here it is, above everything, important that the non-commissioned officers should be thoroughly efficient, and that the greatest care and attention should be devoted to their instruction, because it is only when the fire is well directed that a good result can be guaranteed, it being understood, of course, that the men firing have been properly taught. The instruction of the non-commissioned officers begins with exercises in the field, where they will learn judging distances; how to avail themselves of cover; to choose the object to be aimed at; the adjustment of the sights; the distribution of fire; the transmission of orders; and the observation of the effects of the fire. When these important details have been thoroughly mastered, training by groups follows, care being taken that the enemy should always be represented as much as possible at battle ranges, in various natures of country, drill cartridges, and, from time to time, blank being used. The object to be kept constantly in view is the scrupulous instruction of every man in the whole art of musketry, and instilling into him the necessity for the most rigorous fire discipline.

The instruction of the group is followed by the organisation for battle and the training of sections. Simultaneously with the ballistic and tactical exercises, the exercises peculiar to cavalry, connected with fire-combat, must be carried out; dismounting under fire, shelter for the held horses; rapid organisation of the sections into skirmishers, the duty of the horse-guards, and the remounting expeditiously and in order after an engagement. As is known, to break off an action is by no means easy, especially when time presses. It will very frequently be necessary to place the Section-leaders in some situations, where the question will be of rapidly forming a resolution, of skilfully taking up a position, of directing unerringly a fire-combat. Particularly important is the instructive organisation of supplying the firing line, whether of groups or sections, with ammunition. The more attention and time is given to these exercises, the more will the men and their leaders profit by the lessons.

There is a demand at the present time for whatever will enable the best results to be obtained from dismounted firing. For example, the German cavalry are asking for the carbine (model 98) with "S" ammunition in order to obtain greater

ranges and flatter trajectories; also a larger supply of ammunition, and the attaching to the cavalry divisions of several machine gun detachments. It is absolutely certain that these three demands are quite justified. By agreeing to them the fighting power of the cavalry will be sensibly strengthened.

The limits of this essay will not allow us to examine in greater detail the questions dealing with the organisation of the arm.

For the training of the cavalry there is a demand for:—

1. The allocation of a larger amount of ammunition for battle firing;
2. The supply of range-finders to the units;
3. The training of a larger number of officers and non-commissioned officers at the Infantry School of Musketry, or, failing that, with infantry units.

It is indisputable that these demands are absolutely justified. In the meanwhile, the resources at the disposal of the cavalry are sufficient for attaining the desired result, if only the goodwill and the necessary painstaking are there. The whole course of instruction must always have one great aim in view; and let us once more repeat that this aim is, above all, the cavalry education. In future wars the cavalry must expect to meet that of the enemy, not only during strategic reconnaissances, but also in operations attempted against the enemy's flanks and against his lines of communication. It is here that the issues will be definitely joined, because ultimate success will depend upon defeat or victory in this duel. Consequently, the important point above everything will be the struggle with the enemy's cavalry. The qualities of the leader, the number, and the intrinsic value of the men will be the decisive factors here. Once the enemy is swept away, the cavalry will have to solve the most diverse tactical problems—from battle-reconnaissance up to, let us hope, the pursuit—and, brought face to face with infantry and artillery, will be obliged to have recourse to the carbine. Then will come the opportunity of showing their skill both as marksmen and skirmishers. "In short," as a distinguished German cavalry leader recently remarked, "we attach equal importance to the carbine and the lance, but nothing more!" The cavalry is the "Mounted Arm," and that indicates clearly the line of conduct it has to follow, with all the energy at its command. War to-day demands that in addition to its purely cavalry method of fighting, it must be also competent to carry on an effective fire-combat with its rifles, which will be fully as important, and is at least as useful. Let it rise to the height of both duties, and the opportunities of gathering laurels in the future will no more be wanting than they have been in the past.

There is a demand for the best results to be obtained from dismounted fighting. For example, the German cavalry are asking for the carbine (model 98) with "2" ammunition in order to obtain greater

THE FUTURE RÔLE OF THE FRENCH NORTHERN SQUADRON.

Translated from *La Vie Maritime* of 10th July, 1908.

Communicated by the Director of Naval Intelligence.

UNDER the above title we have received the following article from a most distinguished officer. We willingly publish it, as all opinions may be freely expressed in this journal. It is true that on certain minor points we do not altogether share the author's opinions, but we shall have an opportunity of explaining ourselves hereafter:—

I.

First. — Initial Conditions. — There is direct relation between the organ and its function. It will be quite logical, therefore, to seek for the military utility of the Northern Squadron among the initial conditions under which it was established.

The Northern Squadron consists of divisions of armoured cruisers and destroyers.

The armoured cruisers are of one type, and their general characteristics may be taken to be as follows:—

Their offensive power consists chiefly of an armament of 164.7 mm. (6.5-inch) and 100 mm. (4-inch) guns, supplemented by a few guns of 194 mm. (7.5-inch); while their defensive strength consists of an armour belt stretching to 120 cm. (4 feet) above the water line. Their normal coal stowage is 1,600 tons, which can be increased to 2,000 tons.

In short, these ships may prove very useful if circumstances are favourable to them. All the cruisers can steam 20 knots for several hours; but, in the majority of cases, only in fair weather.

The destroyers can easily attain 18 to 20 knots under ordinary weather conditions. For torpedo-attack it is evident that these craft are not so easily handled as the true torpedo-boats, and are, in this respect, inferior to them, but it would appear that the increased range of the torpedoes, and the consequent collective fire, ought to restore the balance. The torpedo-boat destroyer may therefore be considered as a sea-going torpedo-boat for service in the fleet, which, however, resumes its former rôle of "destroyer" when near the coast.

This brief statement demonstrates the ultimate importance of the combined action of torpedo-boat destroyers and armoured cruisers.

Secondly.—*Future Rôle of the Squadron.*—In the event of a declaration of war we may premise two cases :—

1. The Northern Squadron may endeavour to at once join up with the French Mediterranean Fleet, in which case its disposition in time of peace, with Brest as its base, becomes inexplicable. Moreover, to give the enemy absolute command of the Atlantic, if only for a very short time, would have a most disastrous effect on the public mind, and would complicate the ultimate task of the battle-fleet.
2. The Northern Squadron may put to sea as soon as it learns of the departure of, and probable direction taken by, the enemy's battle-fleet. Its search accomplished, it would keep in touch during the day, so as to be able to harass the enemy by night, and renew its attacks until the arrival of the French battle-fleet, and thus play the part of a "screening force." It must be fully understood that the "screening force" will have as its objective the principal division of the enemy's battle-fleet. If all goes well this will have a direct bearing on the final action between the two battle-fleets, whilst the damage to a cruiser division will always be limited to units of the second line, and will not weigh in the balance during the final engagement. Consequently, the risks run by the enemy will be much greater.

Finally, it must be pointed out here that the geographical situation of France gives her the inner circle in which to work, in case her neighbours take the offensive, and so the task of the "screening force is facilitated."

Thirdly.—*Disadvantages of an Immediate Falling Back of the Northern Squadron on the Mediterranean.*—This course is in opposition to the principle that concentration of force should coincide with concentration of effort. The arrival of six or nine armoured cruisers with the torpedo flotilla will not strengthen the line of battle on the day of decisive action, as the great ranges at which the action will be fought would expose the cruisers to the fire of the heavy guns without any appreciable corresponding gain. It is generally accepted that an armament of 164.7-mm. (6.5-inch) guns is ineffective beyond 4,500 metres (4,923 yards), unless supported by heavy calibre guns.

A diminution of the distance will not restore the balance between the heavily-armed and protected units, and those with only medium armament and protection.

To take its place in the battle-line and co-operate in the final action, a ship must possess an armament effective up to between 6,000 and 7,000 metres (6,564 and 7,658 yards).

The 194 mm. (7.5-inch), model 1902, guns of the *Edgar Quinet* would, perhaps, be capable of this; but the model 1893 and 1896 guns of the *Gloire* and *Montcalm* type, would not.

The only conceivable offensive part which can be played by these armoured cruisers is, therefore, that of a "screening force" before the fleet action, or that of a reserve force after the battle. To subordinate the former use of the cruisers to the latter would recall the system which kept the cavalry divisions to the rear of the army during the war of 1870; in naval language it would be "putting the breaking stops inside the large hanger," and would be contrary to the principle of the concentration of effort for the decisive moment.

It follows from the foregoing that the offensive on the part of the Northern Squadron must be limited to that of a "screening force."

Viewing the matter from another standpoint: would the arrival of this squadron be beneficial for the scouting service of the battle-fleet?

If the scouting service is limited to obtaining intelligence and keeping touch with the enemy, no good purpose can be served by increasing the number of fighting units which take part in it, for, as a matter of fact, we shall always have an approximate idea of the enemy's objective, and, if the field of operations should be in the Mediterranean, it will be much restricted. If, on the contrary, the struggle takes place in the Atlantic, it would be advantageous to have there from the outset a strategical base for scouts.

The necessary conditions for keeping touch with an enemy are speed and invisibility. Large divisions lack these qualities, and, as they do not possess the necessary elusiveness for escaping from the enemy's scouts, they will be involved in secondary fighting, during which the intelligence and scouting services run a grave risk of being abandoned.

It is impossible to escape from the enemy's scouts except by avoiding them altogether; resistance is of no use. Isolated units, not divisions, working in conjunction with each other, are therefore, necessary. It is also logical, as a set off, to suppose there will be a division of armoured cruisers supporting the scouts. But the development of this division would lead to a conception of the offensive, which is not in harmony with the functions of a screening force, and is unsuitable for a protracted action.

On the other hand, there is an advantage in having the largest possible number of craft in touch with the enemy which are not units of the fighting line, *e.g.*, destroyers or fast despatch vessels.

To sum up, the most rational solution is to concentrate all the armoured cruisers at Brest, with the exception of those which are indispensable for scouting for the battle-fleet—probably one division.

Fourthly.—*Night Attack by Screening Force.*—The part of the screening force is to "fasten on" to the enemy. It ought to seek him out, to keep in touch with him, and to harass him until the arrival of the French battle-fleet, and should carry out its attacks by means of destroyers.

The justification for these operations lies in the fact that the utmost advantage is taken of circumstances to counterbalance the disproportion between the opposing forces.

Night-time allows the fighting distance to be reduced, and thus increases the utility of the medium artillery. Darkness, moreover, diminishes the liability to damage of the smaller squadron, owing to the difficulty of sighting them. Above all, the suddenness of the attack, the superiority in speed, which might easily amount to five or six knots over that of the battle-fleet while *en route*, and the invariable initial indecision of the defence, are counterbalancing factors which justify the attack, by night, of the weaker on the stronger, if that attack is resolutely pushed home by well-trained units.

The smaller units must be elusive and well handled, and not act in such a manner as to hamper the larger ships. The attack should take place in autonomous divisions, and it is imperative that the weaker force should make use of the utmost advantage that can be obtained by co-operation between the two arms—armoured cruisers and torpedo-boats.

A night attack should, therefore, be sudden, and should consist of a run past by the cruisers, at between 18 and 20 knots, the intensity of whose fire should pave the way for a successful destroyer action. This attack ought to be repeated later.

The enemy's scouts would be unable to stop the advance of a division at a speed of 20 knots. There would be little chance that sufficient forces for this would be found at the point of attack, such a thing being almost impossible at night time. It may, therefore, be admitted that the division would be able to break through the scouting force and to steer for the enemy's main fleet. The destroyers would act in single line, covered by the cruisers, whose fire would open the way for them.

At about 2,000 metres (2,188 yards) from the enemy's main squadron, whose size would indicate its importance, the cruiser division would send on the destroyers which, up to this point, had been covered by its fire.

The destroyers would all attack on the same side, so that no confusion would be possible. They would fire their torpedoes at the centre of the enemy's squadron at about 1,000 metres (1,094 yards) range, and then retreat to the rendezvous at full speed, as for the attack, until at such a distance as to be relatively safe.

The enemy's fleet would be a satisfactory target, because its speed would probably not exceed 14 knots, and its close formation and lack of mobility would make it a compact mass. An error in sighting will, therefore, be of small importance.

The mobility of the cruiser division, its rapidity, and the uncertainty of its route, will greatly reduce the chances of successful torpedo attack on it.

Finally, account must be taken of the results which accrue from the confusion in the enemy's line, and of the nervous effect on a defence which is being kept in a state of continual suspense.

Keeping touch with the enemy is an operation which demands speed and invisibility more than ever. We cannot expect to follow every change of course by an enemy in his own waters, but it is not too much to hope that well scattered ships will be able to keep in touch with the enemy during the day-time, by means of his smoke. By this means, should the enemy attempt to clear his horizon of vessels, he would be obliged to organise raids which would vanish into space.

Should the enemy's scouts endeavour to force on an action, they will lose touch with their main force, and must be opposed by units, against which they cannot fight, on account of their mobility and small degree of visibility. In short, the advantages of the feebler units must be developed to the maximum.

Communication between the advanced squadron and its covering force is assured by means of wireless telegraphy, search-lights, or despatch-vessels. A simple system of conventional signals by wireless telegraphy must be devised to avoid interference by the enemy.

It is difficult to lay down any general rules with regard to the method to be employed by the commander-in-chief in leading his squadrons during the day, whether concentrated or not, or in concentrating them at night and directing their method of attack. The question is rather one of an organisation which must vary according to circumstances. It is probable that the attacks will not all succeed, that the divisions will not find the enemy in the sector in which he was thought to be, and that unforeseen difficulties will arise to bring their efforts to nought; but the perpetual menace of these attempts, and the success of a small number of them, will lower the *morale* of the enemy, and so justify the part played by the screening force.

II.

Practical Training.—The three following points should determine the training to be given:—

1. Search.
2. Keeping in touch.
3. Night attack.

1. Searching exercises are merely a question of tactics. It is only necessary to practise them and to train the vessels in them.

2. The practice of keeping touch with the enemy has not yet been satisfactorily attained. By day and night the most unlikely situations arise. Contact by night is practically

impossible. Contact by day should be kept by detached vessels according to the principles already laid down.

The concentration to be carried out between the time of successful search and getting into touch with the enemy should be frequently practised. It is necessary to carry it out rapidly, out of sight of the enemy, whilst the appointed destroyers make for their posts of observation. The relations between the latter and the main squadron should be studied during the exercises, in order to find out the best method of sending messages—by despatch-vessels, search-lights, or wireless telegraphy.

It is equally necessary to find out the most convenient distance to which each destroyer division may be sent, and a return must be made to simple signals, such as the old distant signals of balls and shapes.

It should be noticed here that the service of the look-out vessels will never be very trying, as there is no reason why the cruisers should be more than 20 miles from the enemy.

3. The training for attack should comprise both independent and collective exercises.

The look-outs and internal organisation must be perfected.

Cannon tube practice at night must be carried out, and actual night-firing if possible.

Search-lights and use of night sights must be practised.

Torpedo-firing at night at objects representing a fleet at a distance of 1,300 metres (1,641 yards) must be carried out.

The ships should also be accustomed to joining up at sea, and to the use of recognition signals.

Sham attacks by night should take place between single ships, between ships escorted by destroyers, and between divisions, at progressive speeds.

Problems should also be set in searching, keeping touch, and attack.

III.

Conclusions.—The ideas expressed at the beginning in giving the broad lines on which the squadrons should be used, have enabled us to lay down a corresponding programme of training. But the practice of suitable objective and progressive problems will alone enable agreement between theory and practice to be realised. It would be misleading to lay down empirically once and for all the best method of keeping in touch or of attack. The experimental method is preferable if it can be developed along progressive lines in harmony with actual circumstances. This is what we have endeavoured to prove in order to demonstrate the importance of proceeding by means of exercises, which, with all that they entail, approach reality as nearly as possible.

We must devote earnest attention to the question of endurance, provide the best possible *matériel* and train the *personnel* to use it. Consequently, we must not hesitate at having exercises lasting over several successive nights, or at enlarging the field of operations of the screening force.

NAVAL NOTES.

The following are the principal appointments which have been made: Rear-Admiral—J. Startin to be Rear-Admiral in Home. Channel Fleet. Captains—H. Lyon to "Tamar," and as Commodore, 2nd Class, at Hong Kong; M. R. Hill to "Vindictive"; J. P. Rolleston to "Repulse"; H. V. Elliott to "Hannibal"; H. G. Sandeman to "Dido"; the Hon. F. R. Boyle, M.V.O., to "Antrim"; D. St. A. Wake to "Minerva". Commanders—E. G. Davy to "Trafalgar"; O. M. Makins to "Imogene"; A. T. Taylor to "Emerald."

His Majesty the King, on the 6th of August, inspected the new first-class battle-ship *Agamemnon*, which acted as guard-ship during the Royal visit to Cowes. In the afternoon their Majesties proceeded on board the *Indomitable*, and went for a short run in the Channel in her, returning in the evening to Cowes. On the following day their Majesties proceeded in the *Victoria and Albert* to Portland, where the King inspected the Channel Fleet, which was lying there under the command of Admiral Lord Charles Beresford, returning to Cowes again in the evening.

The first-class battle-ship *Albemarle*, flag-ship of the Rear-Admiral in the Atlantic Fleet, was paid off at Chatham on the 24th ult. and recommissioned on the following day for a further term of service in the same fleet; the flag of Rear-Admiral Sir J. Jellicoe, K.C.V.O., C.B., was struck on board the ship at sunset of the 25th ult., and that of Rear-Admiral W. B. Fisher, C.B., his successor, hoisted on board the ship on the following morning. The first-class battle-ship *Bulwark* was commissioned at Chatham on the 18th ult. for service in the Channel Fleet.

The first-class armoured cruiser *Bacchante*, flag-ship of Vice-Admiral Sir H. D. Barry, K.C.V.O., commanding the Third Cruiser Squadron, is ordered to return to England to change admirals and staff, arriving at Chatham about the middle of October. Rear-Admiral Sir H. B. Jackson, K.C.V.O., will hoist his flag at the same time in the *Bacchante*, in command of the squadron, in succession to Sir H. D. Barry.

The second-class cruiser *Fox* left Devonport on the 15th ult. for the East Indies; she was met at Malta by the *Highflyer*, which is returning to England for repairs, and whose place on the station she is taking.

Launch of Submarine C17.—This vessel, the first of the class to be built in one of the Royal Dockyards, was launched on the 13th ult. at Chatham. The ceremony was of a private character, and the vessel herself has been built under conditions of close secrecy, the shipyard being enclosed and all the workmen who have been engaged on her having been sworn not to divulge any information about her. Her dimensions are as follows: Length, 130 feet; beam, 13 feet 6 inches; with a displacement of 813 tons when submerged. The engines are to develop 600-I.H.P., which will give her a speed on the surface of 13 knots.

Accidents to Ships of War.—A Parliamentary Paper, giving the number of ships and other craft of war which have been in accidents since 1st January, 1901, has been issued by the Admiralty. The return states that during the period, 1st January, 1901, to 27th May, 1908, the number of His Majesty's ships and other craft of war which have been in accidents was 442. The number of His Majesty's ships and other craft of war which have been totally lost was 16, including the loss by fire of the *Forte*, coal dépôt. The loss of picket-boat of the *Edgar*, the steam-boat and pulling cutter of the *Vernon*, the gig of the *Defiance*, a submarine mining vessel, and the steam cutter No. 219, are excluded. The original cost of ships and other craft which have been totally lost, including guns and naval ordnance stores, was £1,951,974. The number of vessels which have been in accidents and which have been repaired during the years 1901 to 1906 was: in His Majesty's dockyards, 218; outside His Majesty's dockyards, 60. The number of lives lost as a result of accidents on board His Majesty's ships was 408. The annual amount of pensions and aggregate amount of gratuities awarded to the dependants of those who lost their lives were: pensions, £2,592; gratuities, £3,290.

The following are the principal promotions and appointments which have been made: Rear-Admirals—J. J. De Percin and L. R. De Marolles to be Vice-Admirals. Capitaines de Vaisseau—P. P. Lecuve and C. E. Motet to be Rear-Admirals. Capitaines de Frégate—M. Morin, A. M. E. Boyer, L. M. La Porte, C. F. Diddot, M. H. Mercier de Lostende to be Capitaines de Vaisseau; C. F. Legendre to "Cassini"; L. G. Viaux to "Dunois" and Command of 3rd Torpedo Flotilla and 2nd Submarine Flotilla of the Mediterranean.—*Journal Officiel de la République Française*.

General.—The first-class battle-ship *Verité*, which conveyed the President of the Republic to Reval on his visit to the Tsar, arrived at Brest with the escorting ships of the squadron on its return from this duty on the 6th ult.; Vice-Admiral Boué de Lapeyrère, who has been in command, struck his flag on board the *Verité* the next morning and resumed his duties as Maritime Prefet of the port.

The first-class battle-ship *Iéna*, condemned for service after the disastrous explosion last year, is being repaired at Toulon to the extent of making her capable of floating, and to be used as a target. It is stated that the firing experiments will include (1) observation of the effects of projectiles fired at close range on the light armour and superstructure; (2) of the effect of bursting shells after penetration at long distances up to 6,000 metres. The programme of firing will, however, be elaborated by a committee, to be presided over by Rear-Admiral Auvert, composed of a capitaine de frégate, two engineers, a chef d'escadron of artillery, a captain of artillery, and two lieutenants de vaisseau.

In accordance with the recommendation of the Committee appointed to report on the proposal that the Ecole-Navale should be transferred from the *Borda* to a naval college to be built at Brest, Vice-Admiral Boué de Lapeyrère (the Prefet Maritime) and a committee have been charged

with the duty of selecting a site for the building. The naval school afloat dates back to the year 1827, when it replaced the France. naval college at Angoulême; thus history repeats itself.

4,000 officers and men of the *Artillerie* and *Infanterie Coloniale* have been sent as reinforcements to Tonkin during the last few weeks, and it is stated a like number are to be sent towards the end of the present month.

Degradation of an Officer.—The following is an abridged account of the degradation of naval Sub-Lieutenant Ullmo at Toulon on the 12th of June, under the observation of a large crowd:—At 8.45 a.m., a hollow square having been formed by soldiers of the 111th Regiment of the line outside the prison, the order "Attention, fix bayonets" was given; the drums and bugles sounded a roll, and from the prison gate Ullmo advanced into the square under escort of four armed seamen, commanded by a "second maitre." The former commander of the *Carabine* was dressed in full uniform; he looked pale, and advanced with a hesitating step, and his eyes lowered; his appearance was greeted by cat-calls and cries of "à mort, à mort" from the crowd. Arrived in the centre of the square, the party halted, the noise ceased, and in an impressive silence the warrant was read by the Greffier. Capitaine de Vaisseau Dutheil then said, in a loud voice: "Ullmo, Charles Benjamin, in the name of the French people, you are unworthy longer to bear arms, and we degrade you according to law." Premier Maitre de Mousqueterie Morin then approached Ullmo, took off his cap, tore the lace from off his sleeve and the buttons off his coat, and threw them on the ground; then detached the epaulettes, unbuckled the sword belt, and, drawing the sword, broke it in two pieces across his knee, and cast these also on the ground. Hostile cries were again heard from the crowd, and the ensign, now in tears, was marched by the escort rapidly round the line of troops and back into the prison. The whole ceremony did not occupy more than twelve minutes. Ullmo is to be transferred to a prison of the Ile de Ré, and it is stated he has forwarded an appeal against the sentence to the Minister of Marine.

New Submarine.—On the 3rd ult. the new submarine *Turquoise* was launched from the Mourillon-Toulon Yard, and is the last of the group being constructed at that Yard; the other three vessels being the *Emeraude*, now attached to the 1st Channel Flotilla at Cherbourg, and the *Saphir* and *Topaze*, both completing at Toulon. Her dimensions are as follows:—Displacement, 390 tons; I.H.P. of motors to be 600; speed, 12 knots; armament, 6 torpedo-discharges, and she will carry a crew of 21 men. Like the *Emeraude*, the other three vessels when completed are to be sent to Cherbourg, and attached to the Channel Flotilla.

The submersible *Fresnel*, 398 tons, was launched at Rochfort on 16th June; she is one of the *Papin* class.

Fatal Gun Mishap on Board the Gunnery-ship "Couronne."—A serious mishap, caused by the premature explosion of the charge of a 6.4-inch Q.F. gun during the closing of the breech-block, occurred on board the

gunnery-ship *Couronne* on the 12th ult., while at target practice off Salins-d'Hyères, which resulted in six men being killed, seven badly hurt, and fourteen others more or less seriously injured.

It appears that practice had been carried on from the gun—Model 93-97—during the forenoon, an average of six rounds a minute having been fired. The gun had become very hot, and at 11 a.m. practice was interrupted, to be resumed again at 1 p.m. The charge of these guns is in two parts, the cartridge itself and a copper case, containing the primer, an arrangement which has always been considered a very unsatisfactory one. Thirty-four rounds had been fired after the resumption of the practice, and the breech-block was being pushed home, when there was a tremendous burst of flame, and it was blown violently to the rear. The priming, which was being brought up to the gun for the next charge, was ignited, as well as two other charges at the rear of the guns. All the men who were on this part of the deck were struck down by the terrible blast of this hurricane of flame.

Four officers who were in rear of the gun, by some miraculous chance, only received superficial burns, while between Sub-Lieutenant Mouren, who was in charge of the firing, and Midshipman Thévenard, who was taking the time, in the small space of two paces which separated them four men lay dead. Two other officers, who were going through the gunnery course, were thrown down, but only received slight contusions. The outburst of flame set fire to the deck, the flames from the burning of which were visible to other ships lying in the Roads; but there was no panic, and the fire was fortunately soon extinguished. As the *Couronne* is an old wooden steam line-of-battle-ship, and her decks like tinder, had the fire gained a hold, the safety of the ship might well have been endangered.

It is not known what caused the explosion, as the breech-block not being home and locked, the primer could not have been ignited by the blow from the striker, and the Committee of Enquiry, which has been sitting, have not yet made their report.—*La Vie Maritime*, *Le Moniteur de la Flotte*, and *Le Temps*.

The Naval Situation, by M. Rousseau. Letter III.—The principle on which the concentration of naval forces depends conflicts with that of the dispersal of squadrons in distant seas, which had prevailed up to 1904, and has ended naturally in the creation of a new class of ship equal to the world-wide rôle required of the modern vessel.

Generally speaking, naval officers look only at their ships from the fighting point of view, the advantages of different plans of armament, and the improvements to be introduced in these respects, a few only have considered the larger question as it affects their ship, and though admittedly she must be a fighting battle-ship, she must also possess all the attributes for arriving at the place of action at the desired moment, and in the best condition.

The concentration of the fleet in English waters, entailed, if not the complete abolition of the *points d'appui* in distant stations, at least a great reduction in their numbers, and in the importance of those still remaining, and the distance between these thus becoming greater, the

necessity arose for increasing the speed and enlarging France. the radius of action of the ships, hence the introduction of the *Dreadnought* type of battle-ship with a nominal displacement of 17,000 tons, but a real displacement of more than 19,000 tons, on account of the supplementary supply of fuel that can be carried. Large as it is, this displacement is now exceeded, our battle-ships of the *Danton* class are larger, and the displacement of our projected battle-ships is 21,000 tons. In England each new ship built is larger than her predecessor; the American battle-ship, whose design has been submitted to Congress, will displace 22,000 tons, and M. Laubeuf predicts the advent of vessels of 25,000 tons.

As has been said, the new ships of the *Dreadnought* era are necessitated by the ever-increasing demands of the new strategy. In Lord Cawdor's report of November, 1905, we read the Admiralty view on the importance of rapid construction:—"The quicker a new vessel can be put through her trials, the easier is it to introduce improvements which experience has shown to be necessary in succeeding vessels of her class, consequently it is most desirable to finish off the first vessel of a batch as soon as possible." This makes it clear that in constructing the *Dreadnought* the British Admiralty was taking a leap in the dark, and the experiments conducted with this ship show that besides her machinery trials her rôle and efficiency, from a strategical point of view, were also fully considered, and the necessity is also affirmed of constructing new ships in series.

This necessity is greater with the ship of the new era than with her predecessors, for if we consider that they are intended to act at great distances from their base, it is obvious that the naval force of which they form a part must be absolutely homogeneous to give the best results; difficulties might be doubled, and operations might even become impossible were there too great a difference among the ships. All must have the same speed, for the slowest ship regulates the rate of progress of the fleet; they must have the same radius of action, for the distance that can be traversed is limited to the means of the ship carrying the smallest supply or consuming the largest amount of fuel; the guns must also be disposed in a like manner on all the ships, for the fire effect will be greater if a larger number of guns can be converged on the object, and the ships must be protected to the same degree, the thickness of the armour determining the fighting range at which they will be more or less invulnerable without compromising the full effect of their own guns.

The homogeneity of a naval force depend upon all of these questions, and though it need not concern itself with turbine or piston-engines, with B-powder or cordite, or with horizontal or vertical tube boilers, it is evident that the necessities of modern warfare oblige us to push this matter of homogeneity as far as we can; not only are ships of the same military power demanded, but also with the same means of producing this power, for there is besides battle-homogeneity also mobilisation-homogeneity.

If the predominant idea in the conception of the *Dreadnought* is that of, so to speak, producing an autonomous vessel, able to act without reference to *points d'appui* and their resources for supplies and repair, the immediate consequence of the autonomous fleet is the organisation of

a floating service for repairs and replenishing of stores. France. This floating service, now termed *train d'escadre*, is a group of auxiliary vessels able to supply the current needs of a fleet and execute all repairs due to damage in action, or at least those that can be carried out without going into dock. It is with this object that the British Admiralty has constructed the *Assistance*, the *Aquarius*, and other vessels, whose names symbolise their duties. It is clear that the *train d'escadre* will be all the more efficacious the less varied or numerous the needs to be supplied. If all the men in an army had the same sized heads, the same clothes and foot measures, the clothing of them at mobilisation would be much simplified; every man cannot be made alike, but there is no reason why ships should not be similar. If all the boilers in a fleet are of the same pattern, the repair-ships will only have to carry one kind of boiler tube, and if the calibre of the guns is the same, they will have to carry but one nature of projectile; in thus unifying the different elements in the ships, the supplies and material to be carried by the *train d'escadre* is much simplified, and the chances of mistake reduced to a minimum. It may be mentioned that England has put the same nature of boilers in her three latest *Dreadnoughts*, not because of the superiority of this type, but because the *Dreadnought* herself carries them.

Some people affirm that the adoption of a single calibre of heavy gun is the result of the lessons of the battle of Tsushima; this, however, is not borne out by the fact that both the belligerents, Russians and Japanese, have armed their most recent ships with different descriptions of guns, and that they have not discarded guns of a medium calibre. The unification of calibre is necessitated more by questions of mobilisation than by battle conditions.

Moreover, the *Dreadnought* was designed long before the battle of Tsushima, preceding even the commencement of the Russo-Japanese War. In the August, 1903, number of the "Navy League Journal," a new type, an improved *King Edward* of 18,000 tons, was proposed. The *Dreadnought* is par excellence the type of vessel that conforms with the new distribution of the fleet, and synchronises most with the modern formula, "concentration of power and transportability of effort."

English genius has solved the application of this formula, but will the solution be to the profit of that country? Was it wise of the British Navy, with its many coaling stations and arsenals in all quarters of the globe, to show that it is possible to do without such *points d'appui*? There can be no doubt but that it is this demonstration which is the cause of all other navies now adopting this new class of ship. The Germans have increased the displacement of their new battle-ships by nearly 50 per cent., namely, from 13,000 to 19,000 tons. The English have taught the Germans that the world-power of a fleet may reside in itself, and need not depend on territorial possessions along the ocean highways.

Germany perceived that with the *Dreadnought* type the field of action of her fleet might be unlimited, and though previously she had no necessity for ships of large tonnage, she has now modified her naval programme, and is constructing a number of these monster vessels.

It need hardly be said that the displacement of armoured France. cruisers has increased in the same proportion as the battle-ships, and there is now little difference between

the tonnage of the two classes. Properly speaking, the armoured cruiser no longer exists — there is "the line" of battle-ship and the cruising battle-ship, the former is slower, but both have powerful armaments, and their armoured protection is nearly the same. The latest English battle-ship will carry ten 305 mm. (12-inch) guns and twenty 101 mm. (4-inch) guns, the latest armoured cruisers carry eight 305 mm. (12-inch) and sixteen 101 mm. (4-inch) guns, but the former have a speed of 21 and the latter of 25 knots. The principle of homogeneity has made it necessary to place identical guns on board new ships of different classes, the difference between the two types is one only of the number of different fighting elements.

To resume, it may be said that the characteristics of the modern navy — of a squadron of *Dreadnoughts* — are augmentation of displacement to increase speed and radius of action, and reduction in the number of fighting elements to simplify the replenishing of stores and fuel, and the carrying out of repairs. The motto of the new navy is: "Strength with simplicity."—*Le Temps*.

The following are the principal promotions and appointments Germany, which have been made:—Rear-Admirals—Ingenohl to be Second-in-Command of 1st Squadron; Jacobsen to be Second-in-Command of Scouting Division; Gühler to be Second-in-Command of 2nd Squadron. Kapitän zur See—Gühler to be Rear-Admiral; Dick to be Superintendent of Wilhelmshaven Dockyard; Koch to "Schlesien"; Graf von Spee to be Chief of the Staff of the North Sea Station; von Holleben to "Schleswig-Holstein"; Jacobsen to "Kurfürst Friedrich Wilhelm"; Eckermann to "Schwaben"; Bossart to "Mecklenburg"; Trumler to "Gneisenau."—*Marineverordnungsblatt*.

An Imperial Order has been issued giving engineer officers in the Navy the same rank and precedence as officers of the executive branch, and to mark the change in their position these officers are for the future to wear the same swords as those of the last named.

German public opinion has recently shown some concern at the number of mishaps to ships of the fleet (the grounding of the *Scharnhorst*, the *Hessen*, *Kaiser Wilhelm der Grosse*, etc.), which have come to light, and certain journals have gone so far as to ask whether Prince Henry is not too often absorbed by the exigencies of his high position to be able to devote himself as much as he should to his duties as Commander-in-Chief of the High Sea Fleet.

Some surprise has been expressed at the recent apparent supersession of Vice-Admiral Wodrig in the appointment of Director of Dockyards at the Ministry of Marine, especially in view of the fact that he seemed peculiarly well fitted for the post, as he has previously for some years been superintendent of the dockyard at Wilhelmshaven. He has been succeeded by Vice-Admiral Breusing, who was his successor at Wilhelmshaven. The Dockyard Department at the Ministry of Marine is responsible, among other

duties, for the armament, equipment and maintenance of Germany. the fleet. The Department is divided into nine sections :—

- a Administration of the dockyards under a captain.
- b Service of automobile torpedoes under a commander.
- c Service of mines and booms under a captain.
- d Personnel of the dockyards under a captain.
- e Armament and fitting out of ships under a captain.
- f Repairs of ships under an engineer of naval construction.
- g Repairs of machinery under an engineer of naval construction.
- h Hydraulic works under an engineer.
- i Torpedo-boats (new construction) under a civil official.

Steam Trials.—The new first-class battle-ship *Schlesien* has been going through her trials successfully. During a 24 hours' run with the engines developing 3,574 I.H.P., the mean speed was 12·2 knots, with a coal consumption of 896 gr. (1 15-16 lbs.) per I.H.P. per hour. During a three-hours' full-speed trial the engines developed 20,507-I.H.P., making 121·2 revolutions, and giving a speed of 19·53 knots.

A noticeable fact in connection with the speed trials of German battle-ships has been the steadily increasing rate of speed obtained. The four vessels of the *Brandenburg* class, with a displacement of 10,300 tons, which were laid down in the year 1890, had a speed of 16 knots. They were followed by the five ships of the *Kaiser* class, of 11,130 tons displacement, laid down between the years 1896-98, in which the speed was increased to 17·5 knots. In 1899-1900 came another group of five ships, the *Wittelsbachs*, the displacement of which was not much greater than the *Kaisers*, in which the speed was raised to 18 knots. In 1901-02 followed the group of five *Braunschweigs*, in which the displacement went up to 13,200 tons, with a speed of between 18·5 and 18·7 knots. Then in 1903-05 came the five ships of the *Deutschland* class, the last ship of which, the *Schleswig-Holstein*, has recently completed her trials. As originally designed the speed of the *Braunschweig* and *Deutschland* classes was also fixed at 18 knots; but, as we have stated, all five of the first-named type exceeded this speed by a good half knot, and the *Deutschland* also made 18·5 knots on her trials. In response, however, to pressure from the naval authorities the makers of the engines and boilers of the four remaining ships have succeeded in still further increasing the speed, the *Hannover*, *Schlesien* and *Pommern* having all made slightly over 19 knots, while the last of the group, the *Schleswig-Holstein*, in her full-speed trial over the measured mile in deep water, averaged the high speed of 19·5 knots. As the designed speed of the first four of the new German *Dreadnoughts* is only 19 knots, for fleet purposes the *Deutschlands* can be well combined with them to form one squadron if necessary.

New Ships. — The new first-class battle-ship *Ersatz Sachsen* was launched on the 1st of July from the Weser yard at Bremen, and received the name of *Westphalen*; she is the second of the German *Dreadnoughts* to take the water. According to the *Hambourger Nachrichten* her dimensions are as follows :—Length, 472 ft.; beam, 83 ft.; draught, 26 ft. 4 in., with a displacement of 18,000 tons. The engines are to develop 24,000 I.H.P., giving a speed of 19 knots, and she will have a radius of action of 5,500 miles at 10 knots. Protection will be afforded by a 12-inch belt, tapering to 4 inches at the extremities, with 11-inch armour for turrets and casemates,

and 12-inch for the conning-tower. The armament is to consist of twelve 50-calibre 11-inch guns and twelve 6-inch guns, with six submerged torpedo-tubes.

Of the three new battle-ships of this year's programme, the *Ersatz Oldenburg* is to be built at the Imperial dockyard, Wilhelmshaven, the *Ersatz Beowulf* at the Weser yard, Bremen, the *Ersatz Siegfried* at the Howaldts yard, Kiel, the large armoured cruiser "G" at the yard of Blohm & Voos, of Hamburg, a firm which has already built the armoured cruisers *Friedrich Karl*, *Yorck*, and *Scharnhorst*, and has under construction at the present time the new armoured cruiser "F," of last year's programme. The small cruiser *Ersatz Sperber*, at the Imperial Dockyard, Kiel, and the small cruiser *Ersatz Schwalbe*, at the Germania yard, Kiel. Of the twelve destroyers, three are to be built at the Vulcan yard, four at the Schichau-Elbing yard, and five at the Germania yard, Kiel. They are all to be of 616 tons and to be fitted with turbine engines.

A delay, due presumably to the labour troubles, has arisen in the launching of the *Ersatz Württemberg*, building in the Vulcan yard, Stettin, which was to have taken place on the 22nd ult., and no intimation has yet been given as to the date when she now may be expected to leave the slip; she will be the third of the new 18,000-ton battle-ships to take the water. Although the contracts for all the new armoured ships of this year's programme have been given out, it does not appear that an actual commencement has yet been made with any of them, and it is stated that delay has arisen from the plans not having yet been finally settled, owing to the authorities not having come to a decision on the vexed question of the armament. It is stated that Krupp has been experimenting for some time with the view of the construction of 12-inch or even 13.5-inch guns, but it seems certain that the great bulk of naval expert gunnery opinion is against the mounting of any heavier ordnance in the new ships than the 11-inch gun, and even that gun is looked upon by many officers as needlessly heavy.—*Revue Maritime, Marine Rundschau*, and *Neue Preussische Kreuz Zeitung*.

The Personnel of the Fleet: The Officers' Corps. — The following are the numbers of the officers of different ranks on the Active List of the Fleet: 4 Admirals, 7 Vice-Admirals, 16 Rear-Admirals, 75 Captains, 178 Frigate and Corvette-Captains, 403 Captain-Lieutenants, 952 Lieutenants, 398 Midshipmen, and 185 Naval Cadets.

There are, further, 1 retired Rear-Admiral, 10 retired Captains, 22 retired Frigate and Corvette-Captains, and 6 retired Captain-Lieutenants employed on special duties, while 49 Captain-Lieutenants and 87 Lieutenants are employed in ordnance and torpedo duties in the various dock-yards and coast stations.

The staff of the Marine battalions is as follows:—1 Colonel (Inspector of Marine Infantry, with the rank of Regimental Commander), 2 Battalion Commanders, 13 Captains, 14 First Lieutenants, and 22 Lieutenants. The Marine Field Artillery has 4 Captains, 1 First Lieutenant, and 6 Lieutenants, and the Engineer and Pioneer detachment 3 Majors, 1 Captain, and 1 First Lieutenant.

The Engineering Department consists of 10 Chief Engineers and Senior Staff Engineers, 57 Staff Engineers, 101 Senior Engineers, and 162 Engineers, being an increase of 35 over the number of last year.

The Medical Director-General consists of 1 Medical Director-General (with the rank of Rear-Admiral), 4 Inspectors-General, 54 Fleet-Surgeons, 85 Staff-Surgeons, 51 Surgeons, and 52 Assist.-Surgeons, an increase of 13 over last year.

In the Accountant Department are 37 Staff-Paymasters and 166 Senior Paymasters and Paymasters.

Seamen, Stokers, etc.

The Seamens' Divisions number 140 Chief Warrant Officers, 209 Warrant Officers, and 18,557 Petty Officers and Seamen, with 96 Boys' Instructors and 1,554 Boys, a total of 20,556, showing an increase of 18 Chief Warrant Officers, 10 Warrant Officers, 1,331 Petty Officers and Seamen, and 150 Boys.

The Dockyard Divisions number 347 Chief Warrant Officers, 694 Warrant Officers, and 13,249 Petty Officers and men, of whom 930 Chief and Warrant Officers and 10,849 Petty Officers and men form the engine-room *personnel* of the Fleet, which shows an increase of 48 Chief and Warrant Officers, and 714 Petty Officers and men over last year, with a total increase in the divisions of 53 Chief and Warrant Officers, and 821 Petty Officers and men.

The Torpedo Divisions number 106 Chief Warrant Officers, 213 Warrant Officers, and 5,796 Petty Officers and men, of whom 60 Chief and Warrant Officers, and 2,617 Petty Officers and seamen are of the seamen class, while 259 Chief and Warrant Officers, and 3,179 Petty Officers and men are of the engineering branch. There is an increase in the divisions of 17 Chief and Warrant Officers and 362 Petty Officers and men of the engineering branch and of 4 Chief and Warrant Officers and 217 Petty Officers and men of the seamen branch, a total increase in both branches of 21 Chief and Warrant Officers, and 579 Petty Officers and men.

The Seamen Artillery Division and Mining Detachment numbers 25 Chief Warrant Officers, 49 Warrant Officers, and 3,373 Petty Officers and men, of whom 12 Chief Warrant Officers, 23 Warrant Officers, and 677 Petty Officers and men belong to the Mines Division. There is an increase of 1 Chief Warrant Officer, 4 Warrant Officers, and 177 Petty Officers and men over last year, of which increase 1 Chief Warrant Officer, 2 Warrant Officers, and 64 Petty Officers and men are in the staff of the mine detachment.

The Marine Infantry numbers 210 non-commissioned officers and 1,153 men, an increase of 19 non-commissioned officers and 115 men.

The Sick Bay Staff consists of 506 Petty Officers and men of various grades, being an increase of 34 over last year; and there are 346 ships' stewards, writers, and assistants.

The sum total of all ranks is 50,323, being an increase of 3,576 as compared with 1907.

Germany.

Personnel.	Officers.	Doctors.	Non-commissioned Officers and Seamen.				Total all Ranks, 1908.	Increase compared with 1907.
			Warrant Officers.	Pay Officers.	Seamen.	Boys.		
Naval Officers	1,678	—	—	—	—	—	1,678	91
Junior Executive Officers...	—	—	—	398	185	—	583	30
Engineer Officers	330	—	—	—	—	—	330	35
Seamen, Boys, Dockyard and Torpedo Divisions...	—	—	1,709	8,582	29,020	1,650	40,961	3,043
Seamen Artillery	—	—	74	454	2,919	—	3,447	182
Marine Infantry	52	—	—	210	1,153	—	1,415	136
Personnel of the Clothing Department	—	—	—	27	150	—	177	48
Medical Department	—	247	—	214	292	—	753	47
Artillery Administration ...	83	—	109	63	—	—	255	14
Torpedo Personnel (Technical and Administrative) ...	53	—	119	49	—	—	231	12
Mining Personnel (Technical and Administrative) ...	25	—	40	64	—	—	129	17
Accountant Department	—	—	83	214	49	—	346	17
Surveying "	—	—	28	—	—	—	28	—
Total	2,221	247	2,162	10,275	33,768	1,650	50,323	3,576
	2,468		47,855					

—*Etat für die Verwaltung der Kaiserlichen Marine auf das Rechnungsjahr, 1908.*

United States. *Report on Naval Ordnance.*—Rear-Admiral Newton E. Mason, U.S.N., Chief of the Bureau of Ordnance of the Navy Department, states in his annual report that the Bureau has been very much hampered of late by not being able to purchase ordnance material abroad at times when the state of manufacture of such material in the United States or the times of delivery of the manufactured material were not satisfactory. Ordnance material for experimental purposes has been occasionally purchased abroad, but occasions may arise when it will become almost absolutely necessary to purchase such material abroad in order to complete outfits, or because such material cannot be obtained in this country. The Bureau strongly recommends that Congress be requested to embody in the next appropriation bill a clause or paragraph as follows, or something of a similar character: "Provided, that all material purchased under the foregoing provisions of this act shall be of American manufacture, except in cases when in the judgment of the Secretary of the Navy it is to the manifest interest of the United States to make purchases in limited quantities abroad, which material shall be admitted free of duty."

Rear-Admiral Mason considers the granting of authority to purchase abroad almost absolutely necessary. He goes on to say that the torpedo situation is such that in all probability it will be absolutely necessary in order to make a start in equipping the Navy with a sufficient number of

United States.

torpedoes, to purchase at least 100 more torpedoes abroad while the manufacturers in this country are completing their present contracts, and while the torpedo station is getting the torpedo factory, appropriated for last year, in running order. There is also a probable urgent necessity of going abroad for a certain number of armour-piercing projectiles in order to bring into service the minimum amount of reserve ammunition. It will also probably be necessary to purchase range-finders abroad, as so far American manufacturers have been unable to develop a satisfactory range-finder for use on board ship, although several firms have been endeavouring to do so, without success at present.

It is held that the policy of accumulating a reserve supply of ammunition should be continued. It is considered necessary to replace all 8-inch and 12-inch guns now in the Service which are not hooped to the muzzle by guns of a later and stronger design. These guns were designed, some of them for use with brown powder and others for smokeless powder, when smokeless powder was first used in the Navy and long before the decided increases in muzzle velocities and pressures were adopted. These guns, as soon as withdrawn from the Service, will be hooped to the muzzle and relined where necessary, when they can be held as reserve guns for use in replacing other guns for relining. A large number of guns have been under manufacture during the year at the Naval Gun Factory, the Watervliet Arsenal, and various private manufacturing establishments. The policy of accumulating a reserve supply of all calibres has been continued. The necessity for this policy becomes increasingly evident as the deterioration of the guns already in use on shipboard through the erosion of the bore advances. This deterioration, technically known as "erosion," is caused by a softening of the surface metal of the bore under the excessive temperatures and pressures which are developed in our high-power guns and by friction of the powder gases over the surface thus softened. As the surface layers wear away, the rifling is gradually obliterated over a certain length of the bore, with the result that the projectile is not properly rotated and becomes inaccurate in flight—in extreme cases tumbling end over end. It has already become necessary to withdraw from service two of the *Missouri's* turret guns for relining, and several other guns are already nearing the point where they must be replaced.

The present methods of supplying ammunition in turrets and of separating the turrets proper from the handling rooms and turret chambers of the older battle-ships are considered unsatisfactory, on account of the decided increase in rapidity of fire, requiring much greater speed in the handling of ammunition, etc. The Bureau considers it very necessary to replace the turret ammunition hoists on all of the older type of battle-ships by some design of hoist which will entirely separate the turret from the handling room and increase the rapidity of delivery of ammunition.

During the year much has been accomplished in the way of removing from turrets and spaces traversed by powder charges, all electrical apparatus which might, by emitting sparks, cause ignition of powder and consequent disaster. Such apparatus of this nature as must remain in

turrets has been far removed from the location of powder charges and effectively covered so as to be flame-proof. With a view to further insuring immunity from accident due to such cause, the Bureau has adopted for the *New Hampshire* and later battle-ships a type of control for the electric ammunition hoists that will do away with the large and heavy controllers, heretofore used, and substitute a small, compact controller carrying a small current. For the control of gun elevating motors in turrets a mechanical device has been adopted which will give a much finer and better graduated control than it has been hitherto possible to obtain by the direct control of the motors or control through motor generators.

The state of affairs with regard to projectiles is far from satisfactory. The most urgent demand in this matter is for armour-piercing projectiles. In its specifications for these the Bureau has constantly advanced its demands to keep abreast of the developments reported from abroad, considering it altogether inadmissible to be content in a matter so absolutely vital, with any standard lower than the highest. The result of this position is that only two firms are at present even attempting to furnish projectiles of large calibre, and the deliveries from these firms are far behind. A large number of armour-piercing projectiles are now being advertised for, the bids to be opened in a short time, and while the Bureau cannot speak definitely as regards the results of the opening of the bids, it is under the impression that the times of delivery at least will be very unsatisfactory for the above-mentioned reasons, and, therefore, it is strongly recommended that permission be obtained from Congress to purchase armour-piercing projectiles abroad for immediate use until such time as the projectile firms in the United States can make prompt deliveries of material coming up to our highest and best specifications.

It is earnestly recommended that an appropriation be made to provide for replacing all rifles and machine guns of rifle calibre now in use in the Navy with others of the latest type, corresponding with those now in use by the Army. The rifles and machine guns now in use are rapidly wearing out. If a change to the latest type is not provided for in this year's appropriation bill, the Bureau will be forced to purchase a large number of obsolete rifles from the Army to supply deficiencies caused by wear in service. It is not considered advisable to purchase new rifles of a type different from those now in service unless money is available for replacing all rifles in service, as it is extremely undesirable to have two different calibres of small arm ammunition in service.

Experiments with devices for training gun pointers have been continued during the past year, with the result that material improvements have been made. The Bureau expects in the near future to be able to abandon the use of the Morris-tube rifle for a dotter which will give the gun pointers training equal to that obtained with Morris-tube rifle without the attendant dangers.

The Bureau last year submitted an estimate of 567,000 dollars for the purchase of fire control instruments for battle-ships, cruisers and monitors.

United States The amount appropriated for the purchase of fire control instruments was 300,000 dollars. This sum will be expended during the present fiscal year, but as 300,000 dollars is not sufficient to provide instruments for all the ships, some ships cannot be fitted. To complete the installation in all ships, 300,000 dollars more will be required, and the Bureau, therefore, submits this item and strongly urges that it receives favourable consideration.

The Bureau renews its recommendation of last year that provision be made for the construction of two ammunition ships for service, one on the Atlantic and one on the Pacific coast, in connection with the fleets in those waters. These ships to be fitted with appliances for assembling broken-down ammunition, in order that they may serve to as great a degree as possible as floating naval magazines.

Rear-Admiral Mason believes that the intent of the present law is that the inventions of naval officers of war appliances, made in the course of their work and duty under the Government, should be the property of the Government. In practice the result intended is rarely obtained, and even where the officer making the invention is perfectly willing to forego all financial benefit, the method by which the Government may secure the patent rights is one that entails risk of loss of attorney's and Patent Office fees to the officer, and in any case results in temporary financial loss, since the officer concerned must now obtain the patent rights in his own name and then assign them to the Government in consideration of the attorney's and Patent Office fees, and should there be a failure to secure a patent the costs must fall upon the officer. The Bureau recommends that legislation be asked that will permit of a department of the Government applying for patent rights in its own name on inventions of its subordinates and paying the costs of such application. It is also believed that there should be legislation recognising as a principle that the Government owes something more than his pay to an officer who invents a new and valuable weapon or device, and that there should be legislation authorizing a direct payment of a just sum to the inventor.

MILITARY NOTES.

The following are the principal appointments which have been made:—

Colonels.—G. O. Welch, C.B., from Assistant Director at Headquarters, to be Assistant Director of Military Transport, Woolwich Arsenal. G. R. C. Paul, C.M.G., from charge of the Army Service Corps Records, to be an Assistant Director at Headquarters. F. Horniblow, from h.p., to be Colonel in charge of the Army Service Corps Records. C. T. Becker, from h.p., to Command a District. H. M. Sinclair, from h.p., to be a Chief Engineer. F. G. Bond, C.B., is granted the temporary rank of Brigadier-General while employed as Director-General of Military Works in India.

Army Medical Department Report for 1907.—Since the middle of 1907 all officers of the Royal Army Medical Corps on joining Home.

have been required to pass through a three weeks' course of instruction in recruiting duties in London, a procedure which should materially add to their future efficiency as medical examiners of recruits.

Speaking generally, the recruits raised in 1907 may be considered at least equal to the standard of those enlisted during preceding years.

Immaturity has always been the outstanding defect of our recruits, and in this respect little or no improvement was shown during the year under review. Some men do not know their age, others purposely overstate it. It is impossible to form any true estimate of the proportion who, though under age on enlistment, declare that they are 18 years of age or upwards; competent judges estimate this proportion at about 10 per cent. We, however, know that lads who were claimed by their parents as being under 18 years of age appeared just as old as the majority of the recruits of their own standing.

The figures for the year 1907 relating to the number of recruits rejected on inspection cannot be accurately compared with similar figures for previous years, as many men were passed "fit" in 1907 who would be rejected in other years. This is due to the fact that on the 24th April, 1907, recruiting medical officers were directed to pass at "fit" all candidates for enlistment who came up to the physical standards of the infantry of the line. The object of this was to prevent men being registered as medically unfit who were in actual fact sound in mind and limb, but did not come up to military requirements as to height, weight, etc., of some particular corps.

A man who wished to enlist into the cavalry, for instance, but was found too small, was not to be rejected by the medical officer, provided he was eligible for infantry but refused to join that arm. The man would, of course, be rejected by the military recruiting officer on non-medical grounds.

The object of this change was to confine the medical rejections as much as possible to cases in which there was some mental or physical defect. Healthy men who failed to attain the physical standards of infantry of the line were, however, still classed as medically unfit.

In view of this alteration it is evident that the number of recruits passed medically fit for service, shown on the returns submitted by medical officers, will not agree with the number of recruits shown on the returns from military recruiting officers as accepted for the service.

Physical Training of Recruits.

The medical examination of candidates for enlistment in the British Army is probably more severe than that in any raised by compulsory military service, and yet the proportion of soldiers in the United Kingdom becoming inefficient owing to cardiac affections is more than double that in any foreign army. British soldiers invalided from India and the Colonies are not included in this comparison.

Average British recruits are, on enlistment, the youngest and in the poorest physical condition of those in any civilised army. Moreover, they are nearly all confirmed cigarette smokers. They cannot stand work

which would not injure well-fed conscripts of 20 years of age. Still less can they face exercises which would do harm to robust men.

In January, 1907, the new system of physical training, which was introduced towards the end of 1906, became general throughout the Army, and at the same time physical drill with arms was discontinued. The gradual decrease in the severity of the gymnastic exercises has been accompanied by a diminution in the prevalence of cardiac affections among the troops.

The greater part of this improvement may fairly be attributed to a more rational system of physical training. No other factor bearing on this aspect of the health of the troops has changed to any appreciable extent since the year 1904.

Physical training is carried on under close medical supervision. To render this supervision as efficient as possible, the officers of the Royal Army Medical Corps now undergo a complete course of physical training on joining the service.

It has been suggested that the medical supervision would probably be more thorough were a *physical training sheet* made out for each recruit the day he enlists.

This sheet could accompany the man everywhere until he became a trained soldier. It need not entail increased clerical labour, as it could take the place of the "progress report," and of many nominal rolls, etc., which have now to be made out. All details bearing on the physical training of the recruit would thus be recorded on one document for the information of every officer responsible for the man's training and welfare.

The weight of the recruit should be recorded every month.

Sanitation.

In respect to minor services, much has also been done. As a whole the standard of sanitation and comfort in barracks is better now than in former years. At the same time, it is to be acknowledged that the reports of inspecting officers show that there is considerable room for improvement. The old buildings at Cahir (1811), Fermoy (1804), Manchester, Hulme Barracks (1799), Coventry (prior to 1794), Birmingham (1793), Chatham (unknown), Norwich, Cavalry Barracks (1793), etc., long since condemned, are still in use, and though no outbreak of disease is attributable to their occupation, their out-of-date character and general defective sanitary state render them far from desirable habitations for troops. There are many other barracks chiefly in the Eastern, Western, Southern and Irish Commands reported to be in an indifferent sanitary state, as judged by modern standards, and in several instances it has now become a question whether expenditure in repairs on any extensive scale is to be recommended. The recurrent expenditure on old barracks must be considerable, and it would probably prove more economical in the long run to replace many of these buildings by new ones, rather than resort to a system of a patch-work nature. Among those barracks to which special references have been made may be mentioned King Street Barracks in Aberdeen (date of construction unknown), which are described as "antiquated, leaving much to be desired in their lighting and ventilating

arrangements"; the barracks in Edinburgh (prior to Home, 1792), which are reported as defectively ventilated without any feasible remedy for improvement owing to structural defects; the Artillery Barracks at Newcastle (1816); the Cavalry Barracks at York (1794), and at Norwich (1793), the latter described as "old and quite out of date, dilapidated, with cheerless, uncomfortable rooms"; the old hutments included in the Lower Chatham Barracks (unknown); the Shrapnel Barracks at Woolwich, reported to be beyond repair; the barracks at Christchurch (1795, added to, 1875-1880); Dorchester (Artillery 1795, added to 1799, dépôt 1879); and the Llanion Barracks (old barracks) at Pembroke Dock, the last of which are stated to be the most insanitary buildings in that district.

In Ireland the buildings at Mullingar (1814, added to 1897-8-9) are mentioned as being old and considerably out of repair, while the Victoria Barrack hutments in Cork are referred to as dilapidated buildings, rotting and full of vermin. At Ballinrobe the barracks appear equally bad, and at the Curragh the Beresford Barracks are stated to be rapidly decaying and getting beyond repair, the rooms being draughty, cheerless, and very cold in winter, while the wooden hutments at Newbridge are described as being in a condition in which anything short of reconstruction will never make them satisfactory.

The lighting in barracks is bad. In the majority of barrack buildings oil is the sole illuminant, while gas is less common, and in very few instances has electric lighting been installed. Excepting at Hampton Court, practically no new electric light installations were erected during the year under review. Much, however, is being done towards improving the gas lighting in barracks, and at several stations incandescent burners were provided. Among the number may be mentioned Worcester, Warwick, Bedford, Northampton (married quarters), Burscough, Seaforth, and several places in the Irish Command. At Aldershot the lighting of barracks, chiefly by oil, is reported as still unsatisfactory, and it appears anomalous to find oil being used as an illuminant in the new barracks at Tidworth, when the provision of electric lighting, where gas is not available, is considered a modern necessity in all civil buildings and institutions.

Stations in the Mediterranean.

In the report for last year it was stated that the medical history of Malta is, and always has been, the history of Malta fever. From this point of view the garrison of the island has been happy in having during the year 1907 no history. The number of admissions for this disease fell to 11, as compared with 161 in 1906, and 643 in 1905. What this reduction means in actual saving to the national exchequer can hardly be over-estimated. It may be briefly stated as follows: For every man in the garrison of Malta during the year 1905, Government lost five days' pay from this cause alone. In the year 1906 they lost more than two days' pay, in the year 1907 they lost less than one-fifth of a day's pay. In a garrison whose strength is counted in thousands, this reduction is of considerable importance. But the loss to the nation does not consist solely in loss of efficiency or money during actual sickness, the expense of invaliding is also a serious matter. In this respect, too, there has been a

Home. gratifying decrease, the invaliding for 1907 being one-tenth that of 1906, and not much more than one-twentieth that of 1905. And even this figure is too high, since the invaliding for one year must always to a certain extent be affected by the unhealthiness of the year before. In this particular instance this effect has been very apparent, since more men were sent home for change during 1907 than actually contracted the disease during that year. We have not, therefore, benefited yet to the full extent from the improvements effected in the sanitation of Malta, in respect of the incidence of Malta fever. What those improvements are it is hardly necessary to repeat. They may be summed up in a sentence: "The prohibition of goat's milk in barracks." The reasons for this prohibition were given in last year's report, in which also the good results which have actually resulted were foreshadowed. It only remains to be said on this point that the hopes of last year have been amply fulfilled, and we can feel confident that a continuance of preventive work on the same lines will make the present fortunate state of affairs a permanent one.

European Troops Serving in India.

Most valuable work has been carried out during the last two years at the Central Research Institute at Kasauli. The lines of enquiry followed have been those indicated by the results obtained by Koch and others in Europe, which point to the important rôle of "bacillus-carriers" in propagating the disease, and the facts elicited at Kasauli go far towards confirming these results as regards India. While showing the importance of excluding as far as possible such persons from positions in which they would be liable to spread the disease, these investigations at the same time emphasise the futility of trusting to this line of prevention alone.

There seems to be no doubt that in India, speaking generally, the seasons of greatest prevalence of enteric fever correspond to the seasons of greatest prevalence of flies. In a table is given the months of greatest prevalence of flies, taken from Major Roberts's "Enteric Fever in India," omitting stations with an average strength of less than 500. The information was obtained by him from the officers commanding the station hospitals in 1904, and as it merely expresses general opinions, in some cases formed on a limited knowledge of the place, it cannot, of course, be taken as absolutely correct; but as far as it goes it shows a striking general agreement in the seasons of prevalence of enteric fever and of flies.

In order to prevent the employment of "bacillus-carriers" in any occupation entailing the handling of food, all men, British and native, whom it is intended to employ for this purpose in kitchens, messes, institutes, dairies, bakeries, and mineral water factories are medically examined from time to time while so employed. The Widal test is, where indicated, used to assist in the detection of "bacillus-carriers."

The inspection of officers' messes is now a part of medical officers' duty, and especial attention is paid to kitchens.

The present system of employing soldiers of combatant units for nursing enteric fever cases is considered a great danger. These men mix freely with their comrades, and at short intervals return to duty with their units. A certain number have been found to be harbouring *B. typhosus* in their bodies without suffering from any symptoms of

disease, but capable of spreading enteric fever to others. To avoid what may be a frequent means of spreading the disease, it is considered urgently necessary that a special corps of male nurses, whether the R.A.M.C. or men specially enlisted for India, should as soon as possible be instituted.

In last year's report it was mentioned that operating rooms had been sanctioned for the more important station hospitals, and that many had already been established. During 1907 some first-class operating rooms have been supplied with such additional surgical instruments as were required to bring them up to date, and the remainder will shortly be so. All station and section hospitals have been supplied with sterilizers. Aseptic furniture for operating rooms has been ordered from England, and it is hoped that this will be received and issued shortly. In addition to the above, it may be mentioned that a portable X-ray apparatus has been supplied to each division, and is maintained at a station which is most conveniently and centrally situated, and at which specialists in operative surgery and skiagraphy are stationed.

Artillery Reorganisation.—The reorganisation of the Austro-Hungarian artillery can now, in principle, be regarded as completed. Every infantry division of the Army, as well as the two Landwehr divisions, has an artillery regiment. At the present time there are 42 Army artillery regiments, and 16 Austrian Landwehr batteries; the arrangement of artillery for the Hungarian Landwehr divisions is delayed on account of the dearth of recruits.

Each artillery regiment consists of the regimental staff, 2 divisional staffs, and 4 batteries of 6 guns each, 6 ammunition wagons, 1 matériel and 1 telephone wagon. Each regiment has 4 reconnoitring patrols, 1 range-finding patrol, 12 telephone patrols (4 mounted and 8 unmounted), with 12 stations and 36 kilometre wire. The effective of a regiment is 29 officers, 469 men, 218 horses, and 24 guns (in peace 16 guns). In addition to the divisional artillery a corps artillery will be formed in each army corps, which will consist of 2 field and 1 howitzer regiment, each having the same organisation as the regiments of the divisional artillery. Every howitzer battery will have the following wagons, viz.: 12 ammunition, 1 ration, 1 requisition, 4 supplies, and 1 baggage. As the recruit contingent necessary for a definite organisation is not available at present, provisional conditions will, on the one hand, be laid down, and on the other, the present corps artillery, consisting of 14 regiments, will be provisionally changed into howitzer regiments.

According to the reorganisation, there will be 56 artillery and 14 howitzer regiments, 8 Austrian and 7 Hungarian regiments—in all 85 field artillery regiments. The artillery of an army corps, which at the present time, in the event of war, consists of 72 + 6 (Landwehr batteries) field guns and 24 howitzers, will in future consist of 130 field guns and 24 howitzers for the Army and of 24 guns of the Landwehr division—in all 178 guns. The horse artillery consists of 8 divisions, each with a divisional staff, and 3 batteries of 4 guns.

For the heavy artillery there are at present 5 siege howitzer divisions. Each division consists of a staff, in peace 3, and in war 4 batteries, the Ersatz cadre. Each battery has four 15-cm. howitzers, 16 ammunition

Austria-Hungary. wagons, 1 requisition wagon, 2 supply wagons, and 1 baggage wagon. In due course each of the 14 army corps will have a howitzer division.

The mountain artillery consists of 3 mountain artillery regiments and 12 mountain batteries. Every regiment has a staff, 4 batteries, an ammunition park, and the Ersatz cadre; the 2nd Regiment has only 3 mountain batteries.

The fortress artillery consists of 6 fortress artillery regiments and 3 independent battalions. Each battalion has a battalion staff, 4 companies, and an Ersatz company cadre.

In connection with this new armament and organisation of the artillery, a reform will also be effected with regard to the ammunition supply. As the *Fremdenblatt* points out, independent ammunition columns will be formed, each of which will carry about three-quarters of the total allowance of a regiment. Four of these columns for each field regiment and for each horse artillery division will be formed; each of them will be divided into as many sections as the corps concerned has batteries, so that it will be possible to attach a portion of the column to detached batteries. This arrangement is most advantageous, for—more especially as regards Q.F. batteries—the fighting value of small units may be considerably increased by a larger distribution of ammunition.

The infantry has benefited by a similar reform; the division will have four ammunition columns, each of which will carry about 40 rounds per rifle, or about a third of what the soldier carries on his person in war. These columns will also be divided into sections, according to the requirements of each unit. Thus according to this reorganisation scheme, the infantry division and the artillery regiment which is attached to it will each have their four ammunition columns, which will together constitute the divisional ammunition park.

On the march, these columns will naturally be in rear of the unit to which they belong. In action, as a rule, one column will follow at a short distance behind the infantry division, and two columns behind the artillery regiment; of these two, one at least will accompany the troops in front of the divisional hospital; the remaining columns will, at the commencement, remain in rear. At the same time the commanding general has full latitude as regards the splitting up of the columns on the march, and the distribution of the ammunition columns, for the whole object of the reorganisation of the service of supplies is to facilitate the dispositions to be taken by allowing account to be taken of all requirements and practical factors.—*Neue Militärische Blätter* and *La Revue Suisse Militaire*.

Brazil. *Re-organisation of the Army.*—A law voted by the Chambers at the end of last year and approved by the President of the Republic on the 4th January, 1908, has established obligatory military service in Brazil, and has re-organised the Army. According to the terms of that law military service is obligatory and personal for every Brazilian citizen between the ages of 21 and 44 years, as follows :—

¹As a matter of fact the regulation for applying the law specifies that the Regular Army will consist of contingents formed by the States by means of voluntary enlistments, and failing that by means of drawing lots. There is a special engagement for manœuvres, for which service in the Regular Army will not exceed three months.

Brazil.

1st Line Troops:—

Regular Army 2

Reserve of Regular Army 7

2nd Line Troops:—

1st Levy 3

2nd Levy 4

3rd Line Troops:—

National Guard 4

Reserve 4

Reservists of the 1st Line Troops are liable, each year, to take part in the manœuvres for a period of four weeks; those of the 2nd Line to a drill period of from three to four weeks.

The permanent Army will consist of:—

Infantry.—Fifteen line regiments of three battalions each; 12 light infantry battalions; 5 companies of 3 sections of 3 machine guns; 12 sections of 3 machine guns.

Cavalry.—Nine line regiments of 4 squadrons; 3 independent regiments of 4 squadrons; 5 regiments of 2 squadrons for the infantry brigades; 5 troops of orderlies or scouts for the same branch of service; 7 troops of orderlies or scouts for other units.

Artillery.—Five regiments of 3 groups of 3 batteries of 4 guns; 5 howitzer batteries of 6 guns; 3 horse artillery groups of 3 batteries of 4 guns; 2 mountain artillery groups of 3 batteries of 4 guns; 3 battalions of position artillery of 6 batteries; 6 battalions of position artillery of 2 batteries; 6 independent position artillery batteries; 5 parks; 15 ammunition columns.

Engineers.—Five battalions of 4 companies.

Transport.—Five squadrons.

The new Brazilian military organisation, which entails a considerable increase in the peace effective of that country, appears to have for its object the formation of 5 large units (divisions) in peace time, each consisting of 3 infantry regiments of 3 battalions and 1 or 2 light infantry battalions; 1 cavalry regiment; 3 groups of 3 batteries of mountain artillery; 1 howitzer group; 1 machine gun company; 1 engineer battalion; 1 transport squadron.

The army of operations will, in addition, consist of non-brigaded troops (cavalry and light infantry battalions).—*Revue Militaire des Armées Étrangères.*

Germany. **Employment of Cyclists in War.**—In an interesting article in the *Kavalleristische Monatshefte*, Major Immanuel, of the German Army, gives the German ideas on this subject, as follows:

"In substance, German opinion on the employment of cyclists in conjunction with cavalry differs from the French point of view. As is known, we have no cyclist companies in peace time and we do not approve of the organic attachment of cyclists to cavalry. With us the value and importance of cyclists lies especially in their operating with troops of all branches of the Service. There they find a wide field for action in the service of in-

telligence, in connection, orderlies, etc. Our new cyclist **Germany.** regulations has assigned to units the following number of cyclists in war :—

Staff of an infantry regiment, 1; staff of an infantry battalion, 2; infantry company, 1; or altogether 19 cyclists per infantry regiment.

Staff of a cavalry regiment, 1; squadron, 1; altogether 5 to 7 per cavalry regiment.

Admitting that field artillery, machine gun sections, heavy field artillery, pioneers and other technical troops have absolute need of their cyclists for their personal use, there still remains available : 4 infantry regiments of the division = 76+4 bicycles, or altogether 80 bicycles per division and 160 per army corps. If we leave a quarter of those bicycles for the use of the troops themselves, there still remains 120 available for the special use of the army corps.

At the Imperial manœuvres of 1907 a cyclist company of the above-mentioned strength was formed in the VIIth and Xth Army Corps. They remained, however, under the orders of the Army Corps commanders, who, thanks to this small company, had resources ready at hand for the most varied duties. The employment of the cyclist company was limited to the following :—

1. It was charged by the command in carrying out special missions (reconnaissance, connection, security) *independent of the cavalry.*

2. It was temporarily attached to one of the infantry divisions, who might employ it either as an independent troop, or attach it to its divisional cavalry if it thought proper.

3. It was attached occasionally to the cavalry divisions, at whose disposal it was placed for carrying out certain duties according to the orders of the commander of the division.

According to general opinion these flexible methods gave very good results. Use was made of these cyclist troops according to each particular case, they were no permanent drag on the cavalry, and above all not more was expected of them than the case required. Exaggerated demands, and immoderate expectations lead, in peace time, to unreality and to artificial uses, and in war to deception and failure.

How would the question of cyclists of the German Army be treated in the event of mobilization? That is, of course, a secret hidden from our knowledge. It is, however, certain that the attachment, as a rule, of cyclists to cavalry divisions is not contemplated.

One will not err, either, in presuming that in general cyclists will remain with the units to which they originally belong. When roads and time are favourable the commander of the Army Corps or of the infantry division will not hesitate to concentrate all available cyclists in detachments under the orders of officers and to employ them for special missions or to attach them temporarily to the divisional cavalry. The latter is at liberty to use them as a chain for the transmission of intelligence, or as patrols, which, of course, would not prevent them from also being employed for connection with the cavalry divisions thrown forward. The armament of the cavalry with the carbine, its training in dismounted action, and the attachment of machine guns have made our cavalry in the highest degree independent. Signalling sections, wireless telegraphy, and telephones all assist the communication of information in an increasingly efficient manner. Cyclists have, naturally, not become superfluous as a

result of all this progress; they remain, as before, Germany, a valuable and welcome aid to our cavalry, who will make use of their rapidity as far as circumstances will permit. The extent of the capacity of cyclists as a body has, however, limits which may easily become embarrassing to the cavalry to which such a body is attached. War nowadays is made on a large scale, and consequently a small body of cyclists of from 100 to 120 rifles will rarely be completely engaged. Its intermittent use appears to us more important and more useful. In general cyclists will remain with the unit to which they belong and will be brought together, when the situation and the circumstances require, in large or small detachments, which will preferably be placed temporarily at the disposal of cavalry commanders, to whom they may be able to render valuable and varied services."

Army Remounts.—A field officer of the Roumanian Army gives in the Roumanian Military Journal the following information with regard to the remount question in Russia, which it may be of interest to reproduce here.

Russia has six Imperial stud farms for breeding stallions for the 40 stallion dépôts distributed through the different parts of the Empire. Their object is to improve the breed of the horses of the country, especially those of the Don district.

Of these six stud farms, five are in Central Russia and the sixth is in Poland.

The Hrenavoia stud farm produces draught horses. The Strelitz stud farm breeds stallions of Arab blood. The stud farms of Dercule and of Janov (in Poland) produce pure-bred English horses.

The Novo-Alexandrovska and the Limareff stud farms produce half-bred stallions.

Each of these stud farms has a total effective of horses varying from 300 to 700.

The Don district has a number of private stud farms, where the horse known as the Don horse is bred. This animal is the offspring of a gradual crossing of Persian, Arabian, and English blood, so that the larger proportion of the mares on these stud farms are of the type of an English half-breed. The chief stud farms in this district are the following: Mikhailikov, which has 800 fillies and 3,000 horses; Bezuglov, 400 fillies and 1,500 horses; Potcapaiev, 700 fillies and 3,000 horses; Pichvanov, Sopronov and Korolkov.

In addition to the Don district there are in Russia numerous stud farms, the best of which are in Poland, where pure-bred horses are raised. The Don and Caucasus districts furnish more than half of the horses for the Army, viz., from 7,000 to 8,000 a year.

The prices of horses from the Don district varies from 150 to 250 roubles, according to height.

The Cossacks.—Now that the Cossacks have been holding the centre of the world's stage for some days as the mainstay of the Shah of Persia, a review of the history of this famous body of soldiers has unusual timeliness. The Cossacks are a characteristic institution of Russia, dating from the close of the Middle Ages. They were, at the height of their power,

an independent organisation about the close of the sixteenth century, when they even had their seat of Government, which was Democratic, with a hetman, or ataman, at its head. The Don Cossacks are the leading body among them, and their principal homes are the steppes of the Don and Ciscaucasia. It was the Don Cossacks who joined in the rebellion against Catharine II., and were punished by being deprived of their liberties and their Democratic institutions. The Ukraine Cossacks (or Cossacks of the Border Land) were organised by the King of Poland in the latter half of the sixteenth century as a buffer between the Turks and the south-eastern boundaries of his realm. It is these Southern Cossacks who were probably drawn upon for the putting down of the Persian patriots. Their historic distinction was their joining Charles XII., under Mazeppa, against Peter the Great, whose victory at Poltava sealed their fate. The Cossacks have always maintained, in whatever latitude, the distinctive peculiarities of the race, mixed though it is of Russian, Polish and Tartar, with the Russian peasant strain predominating. Their prowess has not always been confined to land incursions, as at one period they engaged in naval expeditions against the Turks in Asia Minor.

The Cossacks are hereditary soldiers, the best of them, the sons of paid fighters for a dozen or more generations. The Russian Government has organised eleven corps of them in encampments, stretching from north to south and from east to west of their vast Empire. Their military training begins in boyhood, and compulsive service at seventeen. Field service begins at twenty and continues for twenty-five years. Each corps receives an allowance of land from the Czar, from the revenue of which it clothes and equips the Cossacks with their uniform of dark green, and their portable arsenal of arms, including a long lance. There are also fifteen batteries of Cossack field artillery. The Cossacks now number nearly two million people, with the head of the Imperial family their hetman, and the fighting force, some part of which is actually fighting somewhere all the time, amounts to fully five hundred thousand men. The *Boston Transcript* says the reason why they are in such favour with reactionary rulers like the Shah is that they seem to be untouched by the progress of the outside world, and are as unprogressive as ever.—*U.S. Army and Navy Journal*.

NAVAL AND MILITARY CALENDAR.

AUGUST, 1908.

- 5th. (W). Count Zeppelin's airship was destroyed by an explosion near Stuttgart, after a flight of 440 miles.
- 6th (Th). King inspected *Agamemnon* and went for cruise in *Indomitable*.
- 7th (F). King inspected Channel Fleet.
- 15th (Sat). H.M.S. *Fox* left Plymouth for the East Indies.
- 18th (T). H.M.S. *Bulwark* commissioned at Chatham for Channel Fleet.
- 22nd (Sat). Abd-el-Aziz, Sultan of Morocco, was defeated and put to flight by Muley Hafid, who was proclaimed Sultan.

24th (M). H.M.S. *Albemarle* paid off at Chatham from Atlantic Fleet.

24th (M). A review was held at Sydney, New South Wales, of the Australian Commonwealth Military Forces and of detachments from the British and United States Warships.

25th (T). H.M.S. *Albemarle* recommissioned at Chatham for Atlantic Fleet.

FOREIGN PERIODICALS.

NAVAL.

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NOTICES OF BOOKS.

The Art of Naval Warfare: Introductory Observations. By Admiral Sir CYPRIAN BRIDGE, G.C.B. Smith, Elder. London, 1907.

This is an excellent little book, and one which will well repay careful perusal. Its author, besides being a recognised authority on naval history, has a wide and well-earned reputation as a writer on naval

subjects; moreover, he is a master of lucid English, has a charming style, and makes his views perfectly clear to his readers. He sets himself, on the present occasion, to expound the leading principles of the difficult art of naval warfare, which he does in simple language, so as to be intelligible to all students of the subject, and his work is, as he tells us,

"A succinct summary of the result of studies frequently interrupted and extending over a period, the length of which will be understood when it is known that the views of the author began to be published (in the *Edinburgh Review*) in 1872."

His main object is

"To show the value—indeed, the necessity—of a knowledge of naval history which, it is held, ought to be studied, not as a mere gratification of antiquarian predilection, but as a record of the lessons of naval warfare. . . . The author believes that the only effective way of giving instruction in the art of naval warfare is to impart to students a general notion of the art, and to apply the knowledge acquired by them to the investigation of particular wars, campaigns, and sea-fights. It will then be possible to make deductions applicable to particular conditions, no matter how recent in date. Throughout it has been endeavoured to make it evident that war is essentially a contest of wits; that in it the human element is the most important; and that in war there is always an enemy who may be, and very likely will be, both active and intelligent."

Sir Cyprian proceeds to point out that in the present day there arises a not easily resisted tendency to attribute to the *matériel* as an element of warfare more importance than it has a right to; the practical result of yielding to this tendency, which often happens, is to treat *matériel* and the study of its composition as though it were more important than the human element in war. Few officers will, we think, be found to deny that such a tendency does exist in certain quarters, and it sometimes seems to be forgotten that, after all, battles are won at sea, not by ships, but by the officers and men in them.

The author covers a rather wide field, and has managed to compress much valuable matter into a very small compass. He first defines the meaning of "Strategy and Tactics," and then treats in a long chapter of what he terms the "Strategy of Peace," dealing with the several branches into which his important subject may be divided, of which not the least interesting is the question of naval training, than which element none can be more important, as the finest war-material would be of little practical value in the hands of those not knowing how to handle it. The Admiral holds strongly the view of the necessity of prolonged service in blue water, without which the necessary familiarity with the sea and its varying conditions cannot be attained.

"A navy," he writes, "that is familiar with the sea in many aspects and in many parts of the world will have acquired no small part of the knowledge which is indispensable in war. A navy not in possession of that knowledge beforehand will have to gain it when war has broken out. Consequently it will have two tasks before it instead of one; it must try to familiarise itself with sea conditions as well as encounter its enemy. Thus neglect of practical sea-training will have put it at a grievous disadvantage."

These are words of wisdom, and the experienced and highly-capable officer who pens them does good service by emphasising this absolute need for blue-water service, when the number of ships on foreign stations has been so much reduced, and so large a number of our officers and men are locked up in the new "Home Fleet," the training schools, and in barracks on shore. There is not a single thing, in Sir Cyprian's opinion, really indispensable to a man-of-war's man, whether he be officer or man, which cannot be learned on board ship.

"War" is the subject of the next Chapter, and is dealt with under several branches, including "Strategy," "Coast Defence,"

"Colonial Defence," and "Commerce," and in this last connection he emphasises the necessity for a sufficient strength of cruisers, because

"A belligerent's ocean trade will be satisfactorily guarded if his naval strength and the employment of his force are such that he can keep open his line of sea communications."

"The Command of the Sea" is next touched on, and in the writer's view

"All study of the conditions points to the conclusion that to gain command of the sea concentration of naval force is essential; but it must be concentration adapted to the circumstances, which will primarily depend on the attitude of the enemy. Learn what that is and arrange your concentration accordingly, for to strike in the dark is not to make war. . . . The enemy's fleet remains the objective until its destruction or the end of the war."

Another chapter is devoted to "Maritime Trade in War," and the necessity of the maintenance of a very numerous body of cruisers is again emphasised, and also the adoption—as part of the strategy of peace—of carefully considered arrangements for getting them to their stations quickly when war is imminent; and the author also discusses the question of convoys and the objections to that method of protection. Then follow chapters on "Joint Expeditions," "Scouting," "Strategic Operations," and "Tactics."

In his concluding remarks, Sir Cyprian, among other things, points out that

"Warfare is a practical art; but it must be considered and dealt with scientifically. This will not be done until those who have to consider and deal with it take a proper pride in their art. It is not a mere pale reflection of the conceptions and practices of pacific life. It has principles and processes peculiarly its own, and efforts to make them approximate to those belonging to other provinces of human activity must issue in failure. Take from any or every other art or employment what will help towards efficiency in war To make the selection may at first sight appear difficult. The difficulty will vanish if the object in making the selection is continuously kept in view. We do not want to turn out among those who will have the direction of a navy, men who are primarily Mechanics, or Chemists, or Astronomers, or Mathematicians. What we do want to turn out is men who will so handle the naval forces entrusted to their charge that they will set at naught all the plans of the enemy. It is beyond our power to turn out men with a genius for war. These happen rather than are made by human arrangements In the meantime let us remember that genius appears in quarters where it is little expected We can count a possible enemy's ships and guns and calculate the number that he will be able to put into line, but we cannot forecast the ability of his commanders. We can, however, avoid the mistake of under-estimating it, a mistake which a navy with a long and glorious history is very likely to make. Drawing too largely on the merits of predecessors and the conceit thereby engendered are the failings of *epigoni*. As has been repeatedly suggested in these pages, the corrective is to be found in the study of history. The more we study that, the more likely will be the abandonment of the habit of thanking Providence that we are not as other naval men are."

And he further points out that naval history is but a branch of the history of war, and the study of it will be incomplete if the branch dealing with war on land is left unnoticed. The two cannot be kept entirely separate, and, more, that the annals of war, either by land or sea, will be most easily understood by those who have some knowledge of civil history, and then he asks:—

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